SEP 8 1939

The Physiotherapy Review

Vol. IX No. 2

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Published Bi-Monthly By
THE AMERICAN PHYSIOTHERAPY ASSOCIATION
APRIL-MAY, 1929

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VOLUME IX NUMBER 2

The Physiotherapy Review

APRIL-MAY—1929

Published Bi-Monthly by the American Physiotherapy Association
Publication Office: 404 N. Wesley Ave., Mount Morris, Ill.

Editor-in-Chief:
DOROTHEA M. BECK,
21 Church St., Montclair, N. J.

General Manager:
GERTRUDE BEARD,
2449 S. Dearborn St., Chicago, Ill.

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Entered as second-class matter Oct. 6, 1927, at the post office at Mount Morris, Ill., under the Act of Aug. 24, 1912.

Membership in the American Physiotherapy Association is five dollars a year, including two dollar subscription for The Physiotherapy Review. Single copies 35 cents. Subscription for non-members to The Physiotherapy Review two dollars a year. Single copies 50 cents

Treatment of Scoliosis by the Compensation Method

By A. Steindler, M. D., F. A. C. S.

Professor and Head of Orthopedic Surgery, State University of Iowa Medical School, Iowa City, Iowa

Long experience with the methods which apply a direct corrective force in the treatment of the spinal and thoracic deformities of scoliosis have convinced the writer of the futility of obtaining permanent corrective results by such methods. He has, consequently, abandoned this type of treatment and adopted, instead, the principle of compensation.

This principle involves the developing of counter or compensatory curves in the movable sections of the scoliotic spine which lie outside of the original deformity. This is done with the avowed purpose of reëstablishing the disturbed equilibrium and alignment of the body as a whole. It is generally known that spinal curvatures, even in more advanced stages, may be confined to one section of the spine only, while the remaining sections retain their natural mobility to various degrees. When, therefore, the body has undergone a state of disalignment because of the primary curvature and the normal relation between shoulders, pelvis, and feet has become disarranged, it is obvious that by counter-curving the spine in its movable section, the normal relation of these structures may be reëstablished. The disalignment finds its clinical expression in the overhang of the body to the side of the primary curve. This feature can be offset or compensated in many instances by establishing a curve of the opposite type below the primary one.

The experience with the usual so-called forcible methods of correction further reveals the fact that they are, indeed, much more effective upon the movable than upon the rigid portions of the spine, therefore compensatory counter-curves are inevitably produced even by the older forcible methods of correction; but it is only rarely that, in a structural scoliosis of any advanced type, enough force can be expended to break the resistance of the primary curve and, thereby, to effect its correction or improvement; and should such correction actually be accomplished by applying considerable force directly to the scoliotic portion of the spine, it would still be a doubtful blessing, because it would have to be associated with a considerable amount of relaxation of the spine. This state of relaxation must be reckoned with later in the problem of maintenance of correction; naturally the relaxed curve is eminently prone to collapse.

In contrast to this the compensation method preserves the stability of the spine. It has for its principle: first, that no more external force shall be expended than is necessary to establish and develop, to the fullest extent, the mobility of the portions of the spine not involved in the original scoliotic curve; second, that the forces maintaining correction should be intrinsic and should come principally from the source of active muscular supply of the body. In other words, that such correction should be, as much as possible, an active one.

Translating these principles into practice, the scope of the compensation treatment would be to increase mobility of the non-scoliotic portions of the spine by active and passive measures. On the basis of a well-developed mobility of these parts, compensatory curves in these sections can then be produced. The further object of the compensation treatment is to maintain these compensatory curves of the mobile section by active muscle control.

In the foregoing we have developed the idea of compensatory treatment of scoliosis in its general principles. Let us see how it applies to the special case.

We shall consider three types of cases: (1) a beginning scoliosis not yet in the state of structural contracture; (2) the case of a moderately advanced structural scoliosis; and (3) the case of a far advanced structural scoliosis with considerable lateral and rotatory deformity and disalignment of the body.

1. Suppose in the case of a milder curve, for example, a left total, the active compensation treatment is instituted. The treatment will develop a lumbar, and a high dorsal counter-curve of the opposite character. It is obvious that the less rigid the original curve is, the more of its ends, or extremities, will be taken in, or drawn into these counter-curves. In a curvature of the spine the center is always the most rigid portion, and the rigidity gradually decreases towards the ends. In the case of a left total scoliosis, for instance, active methods which transform the simple curve into a triple one by adding to it a right cervico-dorsal and a right lumbar curve will finally result in dragging the original curve more and more into the field of the compensatory curves, so that the original curve will, in a case of this type, gradually disappear. We shall then have a right total curve derived from the right lumbo-dorsal and the right cervico-dorsal counter-curves, into which the original left curve has gradually become absorbed. Therefore, the possibility of correction and over-correction of physiological or postural curvatures is just as great as in any form of corrective treatment. Curves of this type can naturally be expected to disappear under the treatment and the body will then return to its original state of perfect symmetry.

2. Next, suppose we are dealing with a moderate structural curve—we will say, a right dorsal curve. In this case also a left lumbo-dorsal and a left cervico-dorsal counter-curve will be developed. According to the degree of the rigidity of the original curve the counter-curves will likewise encroach more or less upon the ends of the primary dorsal curve. The result will be the development of a left cervico-dorsal and a left lumbar-counter curve, which will hold the balance to the primary right dorsal curve, and the primary curve, having its ends drawn into the counter-curves, become shorter. The overhand, or deviation of the body to the side, will disappear and the general alignment of the body will thereby be restored.

3. Suppose we have to deal with an advanced primary curvature, for instance, right dorso-lumbar. The curve occupies already the larger portion of the spine. Probably the underlying portion of the lumbar spine will not be extensive enough to develop a counter-curve of sufficient extent and intensity; probably also the primary curve, being thoroughly rigid and reaching into the lumbar section, will not yield its peripheral portion to the development of such compensatory curves. Such a curva

ture, obviously, cannot be compensated by the compensation method. The body will remain uncompensated and the overhang and general disalignment are not corrected. This type of curvature will yield better results from such forceful methods as that of Galeazzi, or other derotation methods; but, at the same time, the problem of maintaining correction becomes more difficult; whether or not it can be met effectively and lastingly by spinal fusion still remains to be seen.

Practically, therefore, the problem rests upon two angles: (1) to develop the mobility of the non-scoliotic sections of the spine by passive motion and manipulation, and (2) to develop the muscles of the back so that they will be able to control actively such counter-curves as have been made possible by the mobilization treatment. All this is accomplished by special devices and special exercises in the orthopedic gymnasium. A detailed description of these exercises has appeared in the preceding article by our chief physiotherapist, Miss Woodcock. It suffices to say that the policy of the treatment is to keep the development of the muscles which control the counter-curves always abreast with the development of the mobility of the spine. For this reason the physiotherapeutic measures are given a great deal of time in the plan of treatment. They are extended over two or three hours daily and are continued sometimes for a considerable number of months. It is important to maintain the body in the state of newly created balance during all waking hours, and, for this reason, the wearing of a brace which safeguards the new realignment of the body is indispensable. Occasionally, only, casts are resorted to, if a position of compensation, which had been difficult to obtain by the physiotherapeutic methods, is to be maintained. Such casts are, however, never left on for more than a short period, because the demand for the development of the musculature of the back is too urgent, and too much muscle power is lost during protracted cast immobilization.

When a patient has acquired a state of body compensation by the acquisition of well-developed compensatory curves, and when, in the course of treatment, he has gained active muscle control over these curves, one may say that he is practically safe from any progress of the deformity so long as he is able to maintain his musculature in the accomplished state of correction. Consequently, we see that we have our best results in those cases in which perfect compensation has been obtained.

4. We have, in the foregoing, considered three types of cases; in the first, compensation (lateral as well as rotary) leads to complete over-correction and subsequently to the establishment of normal symmetry by active muscle control; the mild and physiological curves. In the second type (moderate cases of structural scoliosis), complete compensation is obtained, and, again, maintained, by active muscle power. In the third type (severe structural scoliosis), compensation is not obtainable and correction cannot be effected by compensation methods.

There remains now to be considered the type of cases in which compensation can be obtained, but in which it cannot be maintained actively because of inherent deficiencies of the muscular apparatus: the large group of paralytic scoliosis. Milder cases of this type can be corrected by forcible methods; more severe structural types can be compensated by counter-curves. All of them must be maintained by external (braces) or internal (operative fusion) means of fixation. But even in these cases restoration of the body alignment by compensation method is essential in the interest of maintaining the body alignment and preventing the curve from progressing; because, unless the body, as a whole, is realigned, neither brace nor operative fusion can be relied upon to prevent the irresistible progress of the curve.

Therefore, the method of treating scoliosis by developing compensatory curves finds its useful application not only in structural cases, as a step leading to active muscle control of body balance, but also in paralytic cases as a means to make subsequent operative procedures more reliable in their end effects.

Some Structural Variations of the Lumbosacral Region and Their Significance

By F. A. CHANDLER, M.D.

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Probably no one subject has attracted more widespread interest and study in the last few years than low back pain, its etiology and treatment. This condition, never fatal as such, but frequently most disabling, has been studied from many angles and has, up to the present time, been quite resistant to a thorough understanding of the factors which predispose to cause or alleviate it.

No symptom calls for a more extensive differential diagnosis than that of low back pain. All of the physiological and structural systems of the body must be considered before any accurate conclusions can be reached. A thorough search of the abdomen and pelvis is imperative, and pathological changes of the ligaments, muscles and vertebrae, as well as the central nervous system, must be kept in mind during the examination.

I shall confine my subject to a consideration of the bony structural variations so frequently encountered at the junction of a mobile segment (the spine) and a relatively immobile segment, the sacrum and pelvis. The occurrence of these bony abnormalities will be considered chiefly from an embryological and phylogenetic standpoint. No attempt will be made to enter the tremendous and tumultuous field of differential diagnosis and but little time will be devoted to the greatly varying methods of treatment.

A review of the muscular and ligamentous anatomy of the lumbosacral and sacroiliac regions would indicate that both are sufficient to withstand all ordinary strains which might be transmitted through the normal bony arrangement of the lower spine and pelvis. The frequent occurrence of bony abnormality in this region gives us a clue to a better analysis of the factors which may cause low back pain. General examinations may be entirely negative. The pain, which may vary from a dull transitory aching to an excruciating pain, is usually located in the lumbosacral region. Sciatic radiation of pain is a frequent accompaniment, and pain on spinal movement is often associated with slipping sensations local-

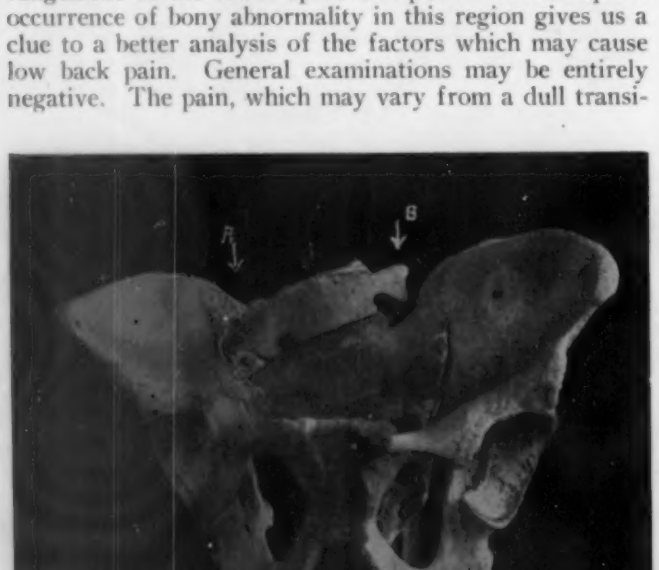

Fig. I. Pelvis with unilateral sacralization of last lumbar vertebra. (A) articulation with ilium and first sacral vetebra. (B) very early stage in development of costal element but no articulation with ilium or sacrum.

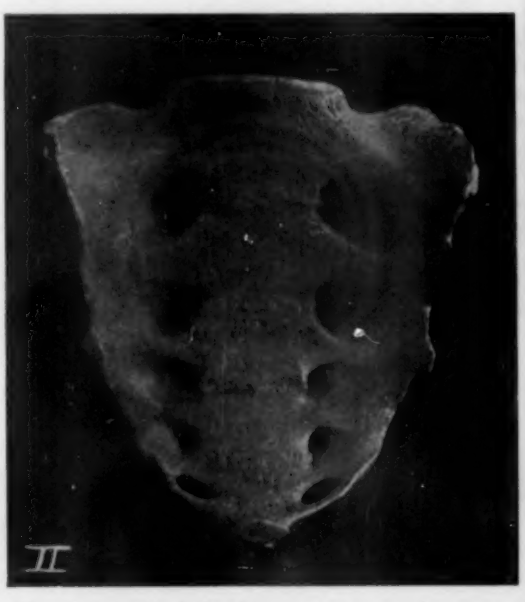

Fig. II. Symmetrical development of normal sacrum.

ized between the lower spinal segments. That a susceptibility of this region to slight injury or strain exists in a well recognized group of individuals is generally accepted. This, in the absence of any definite pathology, may be attributed to an inherent structural weakness of this region.

In the study of the skeletons of various mammalia and reptiles it is interesting to note that the number of vertebral segments of the cervical region is seven in nearly all (Table I). The number of segments in the dorsal region varies between twelve and nineteen, and in the lumbar region between two and seven. The proximal articulation of the pelvis is found to vary from the twenty-third to the thirty-first segment. The presacral vertebrae vary respectively from twenty-two to thirty.

The level of pelvic articulation in man and the higher apes has advanced cephalad when compared to the other groups. The transition from the horizontal to the upright position has resulted in an uncertainty of the level of pelvic attachment. This is seen in the variation in human skeletons, where the proximal pelvic articulation may be the twenty-third, twenty-fourth, or twenty-fifth segment. Considered in the light of pelvic migration, these levels may be expressed as positions of pelvic advance, normal, and pelvic arrest of advance, respectively. Variations of pelvic migration between these extremes may be manifest by bony changes, either bilateral or unilateral, in the last lumbar or first sacral segment. The term sacralization applies to the more or less complete sacral inclusion of the last lumbar vertebra

The level of sacral attachment in about 95 per cent of individuals is at the twenty-fourth segment; in 0.8 per cent at the twenty-third segment, and in 4.2 per cent at the twenty-fifth segment. These percentages of occurrence are greatly increased when analyses are limited to patients presenting low back symptoms.

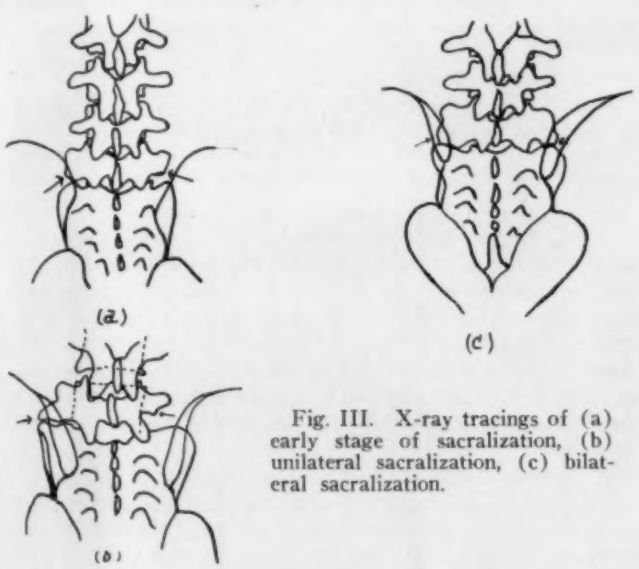

Fig. III. X-ray tracings of (a) early stage of sacralization, (b) unilateral sacralization, (c) bilateral sacralization.

The complexity of the structure of the lateral process is very evident in the study of sacralization. (Fig. IV.) In the cervical region the costal element of the lateral process forms the anterior border of the arterial foramen. At the seventh cervical segment the costal process makes itself known by the formation of cervical ribs; in the dorsal region, it gives rise to the ribs; in the lumbar region, rarely forming ribs; in the sacral segments, uniting to form articular processes articulating with the ilia. It is the complete or partial development of this element of the last presacral vertebra which is chiefly involved in the sacralization process.

The sacralized vertebra (Fig. I), whether fourth, fifth, or sixth lumbar, may fuse completely with the first sacral or may only articulate with it. The unsymmetrical fusion or articulation of the last lumbar vertebra with the sacrum creates a point of weakness in the weight supporting mechanism of the body. The lumbosacral joint, being a point of contact between a mobile segment, the spine, and a relatively stationary segment, the pelvis, is subject to much greater strains than weight bearing alone. Unequal articulation of the lateral masses of the last presacral vertebra and the sacrum increases the strain of weight bearing and movement by abnormal leverage of the articulations between these segments. (Fig. III.)

Contact between the last transverse processes and the ilia is unusual.

Developmental defects of the neural arch and pedicles must be considered as possible sources of lumbosacral weakness. Of these conditions the most common is spina bifida, which may exist in any degree. In spanning these defects the posterior ligaments lose their compactness and strength and are increased in length, permitting motions, especially that of rotation, at the lumbosacral joint. The laminae may have failed to ossify on one or both sides or, as more commonly found, may fail to unite in the midline. Ossification of the pedicles of the neural arch may be incomplete and permit spondylolisthesis by their separation or fracture. (Fig. V.)

Abnormalities of the spinous processes are common and may produce symptoms of contact with each other. This is chiefly found when the normal lordosis is most accentuated.

The lateral articulations in the lumbosacral region show great variation of position, plane and symmetry. If the normal internal external articulation, which lies in a nearly sagittal plane, is supplanted by an anteroposterior joint lying in the coronal plane, and similar to those in the cervical region, rotation of the spine on the sacrum is much less restricted. Inasmuch as flexibility of a part is incompatible with strength, any factor increasing the flexibility weakens that part mechanically. Should these articulations be in unsymmetrical planes or levels, their ability to withstand the strain of weight bearing or of motion is greatly diminished.

A decrease in the lumbosacral angle, in which the long axis of the sacrum approaches a horizontal position, is accompanied by increases in the bearing force which tends to displace the last lumbar vertebra forward and downward on the first sacral surface. Such a condition results in an increase of lordosis and frequently in impingement of the spinous processes. It also is a predisposing factor in the production of spondylolisthesis. (Fig. V.)

The following statement from Morris' Anatomy summarizes the relation of the sacroiliac joints and low back pain:

"It is quite clear from the nature of the osseous surfaces, from the wedge shape of the sacrum and the manner in which it is locked between the hip bows, as well as from the amphiarthrodial character of the articulation, that there can be no motion at the sacroiliac joint. While the joint serves the useful purpose of breaking shocks, the cartilage is too thin and too firmly fixed to the bones to allow even of appreciable yielding, such as occurs upon the intervertebral discs."

In general this is borne out clinically. Exception must be made to this general statement when we consider the fracture dislocations following great trauma.

Symptoms. The most prominent symptom is pain. This is usually local, but not uncommonly is referred to the sciatic and gluteal region. The origin of pain is probably most frequent in:

1. Ligamentous strain, as frequently evidenced by the backache following prolonged illnesses, anesthesia, or overexertion.

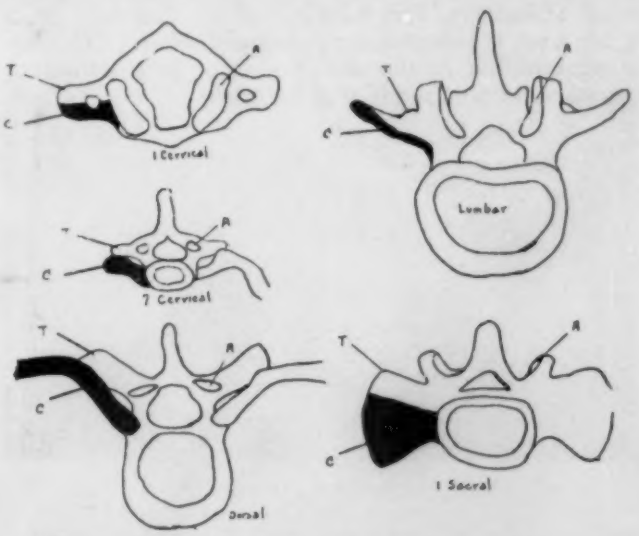

Fig. IV. Showing relation of costal and transverse processes (after Gray).

2. Ligamentous rupture or avulsion following slight or severe, direct or indirect, trauma.

3. Fracture of the pedicles, laminae or transverse processes.

4. Abnormal bursa formation.

5. Periosteal changes resulting from pressure irritation.

Fig. V. Spondylolisthesis. Forward displacement with fracture of pedicle or articular process.

6. Arthritis which is apt to accompany any of the above conditions or is present in a normal articulation.

Treatment. Treatment along preventive lines has been proposed by Dr. E. G. Brackett of Boston. He believes routine X-ray examination and proper classification would materially diminish the incidence of low back disabilities, especially in the heavier types of labor. The discovery of an inherent structural weakness and of proper precautions might lessen the incidence.

The patient suffering from acute ligamentous rupture should be put at rest on a hard bed and the back immobilized. Head and leg traction may be applied to overcome muscle spasm and hot fomentations should be applied almost constantly. After the subsidence of the acute pain, which may be in a few days, a plaster body jacket is applied, fixing the pelvis and extending to the axillae, care being taken to preserve the normal lordosis. The patient is then kept in bed, wearing the jacket until the pain has entirely disappeared. He is then allowed up, in the jacket, and his activities gradually increased. A Taylor brace, removable plaster or leather jacket, or a reinforced corset may then be applied and worn until normal function has returned. A persistent antiarthritic search and routine should be instituted in all cases. Should this lumbosacral disability return, the continued use of the brace or jacket is indicated. Operative procedures, which eliminate the unstable lumbosacral articulation and transfer all its functions to a higher level, is indicated for permanent relief. This may be accomplished by the spine fusion or bone transplant operations without sacrifice of function.

CONCLUSIONS

1. The assumption of the upright position has been accompanied by advance of the pelvis craniad.

2. The level of pelvic attachment in man varies from the twenty-third to twenty-fifth vertebral segment.

3. Bony abnormalities at the lumbosacral juncture are frequent and often due to irregular pelvic migration.

4. The greatest changes are manifest in the development of the costal element of the transverse process.

5. The lumbosacral juncture is frequently a point of inherent structural weakness.

6. The elimination of motion at this level is desirable in restoring stability at the lumbosacral juncture.

TABLE I

Name	Total Number of Vertebrae	Cervical Segments	Dorsal Segments	Lumbar Segments	Proximal Sacral Articulation	Sacral Segments	Caudal Segments
Orang	29	7	12	4 5	23 24	3	3
Man	34	7	12	4-6	23-25	5	5
Gorilla	32	7	13	4	24	5	3
Chimpanzee	32	7	13	4	24	5	3
Alligator	64	8	11	5	24	2	38
Crocodile	58	7	12	5	24	2	32
Ant Bear	60	7	15	2	24	5	30
Llama	49	7	12	7	26	4	9
Camel	31	7	12	7	26	5	—
Rocky Mt. Goat	40	7	13	6	26	4	10
Tamarao	47	7	13	6	26	5	16
Elk	38	7	13	6	26	5	7
Koodoo	45	7	13	6	26	4	15
Kangaroo	49	7	13	6	26	2	21
Virginia Deer	41	7	13	6	26	4	11
Antelope	46	7	13	6	26	4	16
Caribou	40	7	14	5	26	5	9
Giraffe	44	7	14	5	26	3	15
Sea Lion	38	7	14	5	26	4	8
Wombat	39	7	15	4	26	4	9
Cat	52	7	13	7	27	3	22
Cougar	52	7	13	7	27	3	22
Lion	52	7	13	7	27	3	22
Tiger	54	7	13	7	27	3	24
Black Bear	40	7	14	6	27	3	10
Walrus	39	7	14	6	27	4	8
Grizzly Bear	40	7	14	6	27	6	7
Bison	44	8	14	5	27	5	12
Hooded Seal	40	7	15	5	27	3	10
Hog	53	7	14	6	27	5	21
Hippopotamus	46	7	15	5	27	3	16
Striped Hyena	30	7	15	5	27	3	—
Sea Elephant	39	7	16	4	27	1	11
Rhinoceros	50	7	19	3	29	5	16
Elephant	57	7	19	4	30	4	23
Tapir	49	7	18	5	30	5	14
Zebra	53	7	18	6	31	6	16
Dugong	59	7	19	—	—	—	33
Bottle-Nose Whale	44	8	9	—	—	—	27
Manatee	50	6	18	—	—	—	26

Glimpses of Orthopaedic Work in England

By Jessie L. Stevenson

During a five weeks' stay in England, in the summer of 1928, I had the opportunity of observing some of the work for cripples which is being carried on there.

It will be impossible in a short account to give a detailed report of all the phases of the work that is being done. I shall, therefore, mention only some of the most outstanding impressions.

Organization. The central committee for the care of cripples, 117 Piccadilly, W. 1., London, is the coordinating agency. Some of its objects are: to promote a complete scheme for the provision of treatment, education, training and employment of cripples; to act as a central coordinating body for all organizations working for the benefit of cripples; and to provide a central bureau of information on all matters which concern the welfare of cripples.

In rural England, many of the army hospitals have been converted into orthopaedic hospitals. This is true of Wingfield Hospital and Shropshire Hospital—two of those visited. A group of out-patient clinics radiates from each of the hospitals. When a patient is dismissed from the hospital, he is referred to the nearest clinic center for further observation. Wingfield Hospital serves 12 out-patient clinics; Shropshire, 15.

These clinics are visited once a week by the after-care sister (orthopaedic nurse who has qualified under the Chartered Society of Massage and Medical Gymnastics) and once a month by a surgeon from the hospital. Many patients have their whole treatment carried out at the clinic. Plaster splints are applied and changed; metal apparatus is measured and fitted, and exercises are given when ordered.

One of the reasons that the work of the clinics can be carried on so effectively with a small staff is because of the help of trained volunteer workers. Three or four are present at each session, one to undress patients, one to regulate their coming in and out, and one to prepare plaster bandages and assist in their application. A volunteer worker also acts as secretary.

At the hospitals, plaster impressions are taken of all deformities before and after treatment. This is a graphic way of showing progress in treatment.

Children and adults are usually treated in the same hospital or in the same administrative unit. Sun treatment is greatly emphasized in hospitals, convalescent homes, and schools. The percentage of tuberculous bone patients is much higher than that of infantile paralysis.

Coordination of Work. The work in Birmingham is an excellent illustration of the value of unifying the work. All the work for crippled children and adults in Birmingham and the surrounding territory is carried on under one head. The out-patient department, administrative departments, and clinics are located in the city; the hospital and convalescent home in the country. There is a brace shop and shoe repair shop in connection with the out-patient department. Handicapped people do all of this work. The men do the metal work, the women do the leather and finishing work. The young woman in charge of the work done by the women, herself wore two long braces.

Vocational training and placement are an important part of the program at the out-patient department. Vocational work for shut-ins is also provided. Home instruction is given to more than 150 shut-in patients.

The Physiotherapy Department at the out-patient department is splendidly equipped. Between 60 and 70 patients receive treatments daily.

Training of Workers. Physiotherapy workers must have taken a course at a recognized school of medical gymnastics, extending over a year, and must pass the examination given by the Chartered Society of Massage and Medical Gymnastics.

Heritage Craft Schools. Even the briefest report of work for cripples in England would not be complete without mention of the Heritage Craft Schools and Hospitals in Chailey, Sussex. The aim of these craft schools is to treat and train the crippled children so that they may become partially, if not wholly, self-supporting. The spirit which pervades the school is largely due to the guiding genius of Mrs. Kimmins, who has been the director since the founding more than twenty-five years ago.

Practical Details in Physiotherapy

By Rosalie Donaldson

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As the application of Physiotherapy increases, one notices the use of a great many imposing and elaborate pieces of apparatus, and the tendency to neglect or forget the simpler forms of treatment and their careful application. Too much emphasis has been laid on nonessentials and it is possible that this is responsible for the fact that some of the medical profession believe that Physiotherapy is a waste of time.

In practically every textbook on massage the fact that it is essential for the part to be relaxed is mentioned, but it is not often that this is put into practice, and it is rather amusing to note in looking through these books many of the illustrations showing massage being given in positions in which it would be impossible to relax. In order to secure relaxation, of course, it is necessary that the patient be in a position of physiologic rest, not necessarily the position in which he thinks he will be most comfortable. The next is to see that the patient takes advantage of this. The instinctive action is to lift the head to see what is being done and this brings into static action the muscles of the head, trunk and legs, and makes relaxation an impossibility. If this is explained to the patient the request to relax does not seem unreasonable and his cooperation will be gained. I am convinced that the reason for a great deal of the "heavy massage" that one sees carried on is the attempt to make some impression on muscles which are in a state of contraction, because the patient is not in the position of physiologic rest. The advantage of using the body weight in giving massage has not been sufficiently impressed on students. When the body weight is not being used to advantage the effect on the observer is that of the necessity for an output of tremendous strength and effort. Just as the well-trained gymnast performs difficult feats without apparent effort, because he has control of all muscles and perfect coordination, so should massage, correctly administered, appear easy and effortless.

For massage of the leg the patient should be reclining, with a small pillow under the knees and one or two pillows under the head. For massage of the posterior surface of the leg or for the back the patient should lie on his face with a pillow under the chest, one under the abdomen and one under the ankles. The hips should be square and the patient should not be lying on one side as is often the tendency. The hamstrings and the plantar flexors may be treated in this position; however, if the patient is very large it may be difficult to reach them; in this case the prone position will be found more convenient.

When it is possible, in giving massage of the arm the patient should be seated with the arm resting on the ulnar side or with the palm down on the table. Another comfortable position in which the arm may be easily handled, if the patient's condition permits, is for the patient and the physiotherapist to be seated on chairs facing and drawn up beside each other, with the arm to be treated resting on a pillow on the knees of the physiotherapist. One so often sees hands and arms being given massage with the arms lying outstretched across the table, which is a most tiring and uncomfortable position, as the muscles are necessarily in a state of tension. Occasionally one must treat an arm when the patient is lying down. In this case the elbow should be flexed and the arm supported from shoulder to elbow, so that strain will not come on the shoulder joint.

Another point that may seem small, but I believe, is of importance, is the necessity for seeing that there is no tight clothing on the part being treated. One knows that a tight sleeve or trouser leg rolled up will render the most efficient massage useless, because of the obstruction to the venous return. Clothing is always to be removed from the part being treated, even when it does not seem extremely tight, so that the best possible results will be ensured. To illustrate: I saw a patient with limitation of motion of the knee-joint following an operation for nonunion of the femur. The leg had been immobilized in a cast for some time, and heat, massage and exercises had been ordered. The pajama leg had been rolled up to about the middle of the thigh, tightly enough so that it could not be rolled up any farther. This did not even completely expose the scar, which was somewhat adherent. Massage was given directly around the knee, special attention being given to loosening the patella, and to the parts about the joint. A portion of the lower part of the leg was also treated and the part of the thigh that was exposed, that is, just half of it. The massage was good as far as it went, but it should most certainly have included the whole of the lower part of the leg and the whole thigh, particularly the quadriceps group of muscles, because of the limitation of motion.

It would perhaps be best to give more attention and thought to the position in which contractures are stretched, although these positions must be changed occasionally, depending on the size of the patient. I have found that when the hip flexors are involved the position of choice is to have the patient prone, the leg with the contracture nearest to the physiotherapist and held with the knee flexed and resting on the palm of the hand of the physiotherapist, the lower part of the leg resting against the same arm. The other hand may be placed on the patient's buttock or the whole weight of the body may be used to hold down the hips, as there is always an inclination to allow them to be raised off the table. The leg is then moved slowly into extension and adduction, if the tensor fasciae femoris and sartorius muscles, as well as the iliopsoas muscle, are contracted.

In the stretching of the quadriceps group of muscles the patient lies on his face. The leg is held at the ankle, and the thigh is steadied with the other hand; the knee can then be flexed with as much force as may be advisable. In this way the movement can be controlled readily, there being less danger of slipping and of possible resulting injury to the knee-joint, and true, rather than apparent, movement is obtained. This is not the case when stretching is attempted with the patient sitting on the side of the bed or the table. In the sitting position when the quadriceps has stretched as far as is comfortable the hip invariably comes up off the table in spite of the patient's attempt to throw the weight on the affected side to prevent this from occurring.

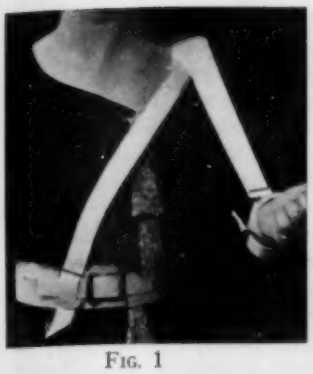

FIG. 1

FIG. 2

FIG. 3

Fig. 1. Flexion belt (front view).
Fig. 2. Flexion belt (back view).
Fig. 3. Flexion belt (front view); arm dropped to show curving of arm band and buckle on wrist cuff strap from arm band to buckle on body band is shown.
Fig. 4. Flexion belt (side view).

The best position in which to stretch either the flexors or the extensors of the elbow is to have the patient lying flat on his back with his elbow resting on a small pillow or a folded sheet to prevent strain on the shoulder joint. The arm is grasped at the wrist and the upper arm, care being taken to keep the forearm in supination. The advantage of this position over others is that the movement is easily controlled and the maximal amount of force may be used if necessary without the danger of slipping that is obvious in more insecure positions. If stretching of the elbow is attempted while the patient is sitting up, the shoulder is forced forward, whereas the shoulder can be fixed when he is lying on his back. It might be well to call attention here to a current method of stretching elbow flexion contractures. The patient is advised to carry a weight. One feels that possibly better results would be obtained by having the weight fastened to the wrist, for the stretching action of the weight on the muscles does not begin until the muscles are fatigued to the point where they must relax completely and it is not until that time that the weight can get in its best work. Usually if the weight is being carried, especially if it is carried by a child, the weight is put down when the muscles reach an uncomfortable point of fatigue. Use may be made of a detachable cuff of leather with a pocket filled with lead shot and this may be worn an increasing length of time each day. The weight may also be easily increased or decreased in this way.

For gaining flexion of the elbow when the extensors are contracted, a belt has been devised. It consists of three bands of webbing, three inches wide, for the lower ribs, for the upper part of the arm curved to allow for elbow flexion, and for the wrist. A strap of webbing an inch wide goes from the back of the upper arm band to the body band to hold the humerus back, thus preventing movement at the shoulder. The cuff for the upper part of the arm is attached to the body band. A strap of webbing an inch wide goes from the body band to the back over the shoulder of the affected arm and fastens to the same band in front. A strap from this one fastened well behind the shoulder is attached to a wrist cuff by a buckle. In this way the forearm is pulled into supination and the strap, which forces the elbow to bend, may be tightened gradually by the patient as the tension of the muscles subsides. This belt is useful after fracture of the elbow, particularly in children, also after arthroplasty and in other conditions in which flexion of that joint is desired. If there is limitation of both flexion and extension the belt and weighted cuff may be worn alternately. Measurements to be taken are the circumference of the lower ribs, upper part of the arm, and the wrist.

When the wrist flexors must be stretched the forearm should be flat on the table in pronation; then it may be held down to the table with one hand and pressure may be applied with the other on the palm of the hand, but not on the fingers alone, for this puts undue strain on the metacarpophalangeal joint, with resulting hyperextension.

The pronators may be most easily stretched by grasping the arm at the wrist when the patient is seated, with

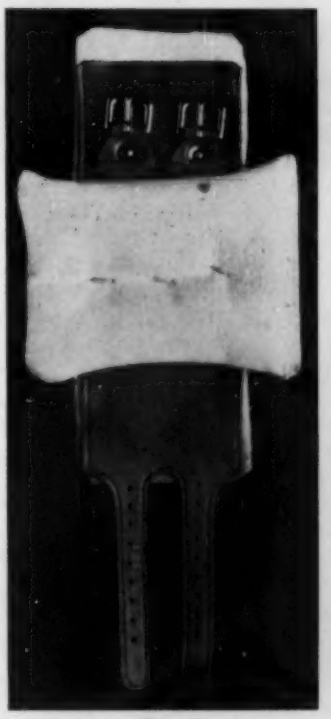

FIG. 5

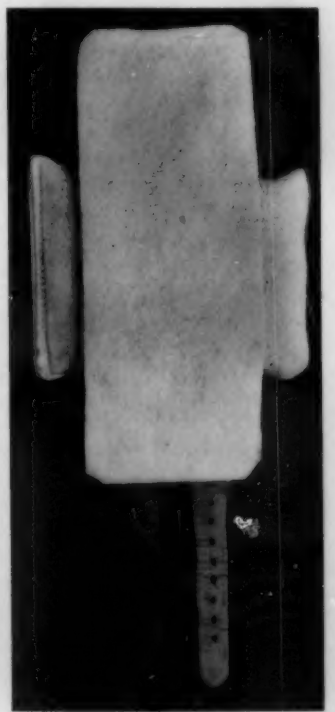

FIG. 6

Fig. 5. Extension cuff showing weight bag.
Fig. 6. Extension cuff with felt-lined inner surface.
Fig. 7. Extension cuff applied.

the arm bent at right angles at the side, and the other hand grasping the upper part of the arm. The force should be applied just above the wrist; otherwise the twist occurs there and gives unnecessary pain and strain and a false idea of the amount of supination is obtained. The supinators may be stretched in the same position and the force is exerted in the opposite direction.

There is apparently a general misconception in regard to the relative value and differences of active exercise, passive motion, forced motion or stretching, and what is termed "passive exercise." Active exercise means any contraction of a muscle, which may be graded from simply "setting" a muscle or in the case of a partially paralyzed one the very slight contraction that may be felt, to the hardest and most strenuous gymnastic exercises. It may be necessary to assist, guide or give resistance in giving active exercise. Active contraction of a muscle is always more valuable than any amount of passive movement, because one is working for normal functioning of the part. There are a few conditions in which the use of active exercise would defeat this aim, such as in the treatment of a recently sutured tendon, when there is the possibility that the stitches might pull out. In this case passive movement of a joint may be desired to prevent any stiffness and it should be given with great care in order not to put any strain on the sutured tendon. Passive movement means movement that is carried out entirely by the operator. To quote from Wright's article on "Muscle Training in Infantile Paralysis": "When a muscle does not function at all it is a help if the physician puts his hand on the muscle to be contracted and performs the movement passively while urging the patient to put forth the greatest possible effort. This is not what is usually understood by the term 'passive,' *because as far as the patient's will is concerned it is active.*" It is this voluntary effort which is absent from real passive movement. In fact, there should be a definite attempt consciously to relax the muscles. For this procedure it would perhaps be better to adopt Mennell's term "relaxed movement." The term "exercise" implies contraction of the muscle. The definition of exercise in the dictionary is "functional activity of the muscles" and "to train by use." Therefore it would seem incorrect to use the term "passive exercise." When most persons speak of "passive exercise" they mean, in reality, assisted movement, when the muscles are acting but impaired in power, or perhaps, forced motion. Forced movement expresses itself and is used in stretching contractures, and sometimes, although not as much as formerly, in breaking up adhesions.

The technical terms which describe exercises are so familiar to the physiotherapist that she is likely to forget that many of these terms are not understood by her patients. They will derive far more benefit from an exercise explained in the simplest terms and demonstrated when possible, for they are often at a loss, because the physiotherapist fails to make clear what is expected of them. Exercises should be given with precision, the voluntary effort being made at a definite command. It is seldom advisable to allow them to be done alone, because a guiding hand is often necessary or perhaps resistance may be given, and vague uncontrolled movements are of no benefit. The exercises should always be counted and fatigue guarded against. There should be time enough between the contractions to allow the muscle to relax completely. Later, as the patient becomes more proficient, they may be done slightly faster, although at no time in a way that will prevent the completion of the full range of motion, the accuracy of the movement and the relaxation of the muscle at the end of the exercise. The practice of giving exercises in a pathologic condition at the speed which a gymnastic class would be put through them is to be deplored.

The neglect of details of treatment may be due to incorrect teaching, slack supervision, or a certain vagueness as to what is really happening inside. It is probably often due to the first and last reasons mentioned, as I have seen these things occur in departments in which the rest of the work was well planned and carefully executed. It may be that too little thought is put on what the treatment is intended to accomplish and that enough effort is not made to eliminate all unnecessary procedures. The vagueness may be due to the usually totally inadequate instruction in anatomy and in applied anatomy in the courses now being given. In a number of them anatomy on the cadaver is not given. A course that does not include at least 100 hours of theory in anatomy and practice on the cadaver should not be approved. Anatomy out of a book probably means very little to the average student. Anyone having a knowledge of the anatomy, and of the physiology of exercise would realize the necessity of the treatment of a whole muscle or a group of muscles and, if a joint is concerned, the groups of muscle that control it. One feels the need for more attention to such details, for simplicity in work, the weeding out of all indefinite procedures and less attention to what Dr. Freiberg calls "apparatotherapy."

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The Value of a "Kinetic Sense"

By Miriam Van Tassel, Physiotherapist
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Little do most of us realize the importance of a "kinetic sense." This sense should have resulted from proper training. Our education should have included all the subjects correlating to our work. Physiology of exercise in which we are taught the effects produced by exercise is perhaps one of the most important subjects. Anatomy gives us knowledge of the structures with which we are dealing. The subject, principles of education, gives us the knowledge by which we teach exercise and grade it correctly according to end in view. Psychology, sociology and pedagogy give us an understanding of the mind and mental attitude of the beings with whom we deal. Kinesiology gives us mastery of the science of bodily movements.

Exercise often may be the most important part of treatment. We must know, first, what exercise is, second, its physiology, third, its purpose.

Exercise may be said to be the functional activity of a muscle. Exercise has a definite effect on the heart, lungs and other vital organs of the body. Following exercise, there is an increase in the pulse rate and respiration is deeper. The increase in the amount of oxygen taken into the body and conveyed by the more rapidly flowing blood causes an increase in the rate of bodily metabolism.

The purpose of exercise is to assure a full-rounded development mentally, morally and physically. To perform any exercise requires a mental stimulus; that is, a message must be sent from the brain to the muscle before the movement can be performed. The desire to do the movement correctly develops the character of the subject. The performance of the movement, or the end attained, results in physical development. In our work the development is most likely to be in a special group of muscles.

Anyone can tell a person to do an exercise. A child can say to another child, "make a fist," but the child does not know how, or why, the fist should be made. He does not know what muscles are involved in that movement, or its purpose. To him it is just an action, and so it is with many of our profession.

In assigning exercise for a patient, it is essential, first of all, that we know what muscles we are trying to cause to develop, and that we realize the physiologic effect of the exercise. We must understand the progression of exercise from the elementary to the more complex movements. We must understand how to make an exercise more difficult to perform, so as to call on the muscle for greater effort. This may be accomplished by a change of leverage. For example, with the patient in the back lying position, with arms folded across the chest, trunk flexion may be more difficult by changing the position of the arms to the neck rest position. In this way the amount of leverage necessary in trunk flexion is increased. Problems of this sort show the necessity of accurate knowledge of anatomy and its correlating subjects.

A muscle may be worked harder by increasing the weight it has to pull. In other words, a muscle should be assisted in performing a movement until it is able to perform that movement alone, with the exception of guidance. When it has accomplished that, then resistance to that movement may be given.

Fatigue of muscles is a great factor to be considered. Fatigue has a physiologic and psychologic effect. The psychologic effect of fatigue is bad, for a person loses interest in doing things that cause him discomfort. We must be able to recognize fatigue and when it becomes evident stop the exercise. In order to avoid fatigue it is effective to obtain complete relaxation of a muscle after a contraction.

Knowing all these things, and allowing our "kinetic sense" to guide us, we should give an intelligent training in exercise and accomplish the results we have set as our goal.

The Treatment of Fractures

By R. M. Handfield-Jones, M.S., F. R. C. S.

(A Lecture Delivered to the Chartered Society on Feb. 29, 1928)

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I have chosen the treatment of fractures for my lecture, because it is an extremely important part of your work and mine. In the life of a medical man in general practice, fractures are to be regarded as more important than the somewhat more dramatic cases, such as cancers and other serious or rare conditions, in that in the latter the chances of cure are remote, whereas in the successful treatment of fractures patients are returned to their daily callings with 100 per cent return of function.

Let me impress on you what it is that you and I are working for in our treatment of fractures. We are out only incidentally to get the broken bones united. That is an incident, though of necessity an important one. Our main object is to return our patients to their original work with their full functional power undiminished, and if we fail in this we may have obtained a perfectly united fracture, but according to the highest standards we have not achieved success.

Massage and medical electricity form one of the professions ancillary to medicine, and the treatment of fractures is an outstanding example of the close cooperation needed between us. Those of you who are working in great institutions in London, particularly in those to which there is attached a medical school, will perhaps gain an erroneous impression of the problems that will face you when you are established in your own practice in a country district, far from the corrective influence of your school and the advice of your teachers. It is for your future guidance that I would speak this evening in the handling of some of those commoner fractures we see so often. I know that in these days your curriculum tends to get longer, as does ours. You are expected to know a certain amount of anatomy, but I believe that the mechanics of joints and of weight bearing are but vaguely taught. Unless you appreciate these things you will not understand what you are doing in the way of massage. I submit to you that you often fail to understand why you do certain details of treatment, though you have been taught that it is right in your training. If that is so it is quite impossible for you to do your work as intelligently as you would otherwise do and as we expect you to do. The Pott's fracture provides an admirable example of the points I wish to emphasize.

POTT'S FRACTURE

Regarding the ankle from the mechanical point of view, it is composed of the lower ends of the bones of the leg, each providing lateral buttresses, the malleoli, and fitting between them and in contact with them and the lower surface of the tibia is the astragalus. On cross section the astragalus is seen to be a truncated cone with the shorter side directed backwards, thus preventing the backward displacement of the bone through the malleoli. It will be realized that the integrity of the ankle joint is dependent upon the malleoli. Pott's fracture is not a fracture of the bones of the joint itself, but of the shaft of the fibula some distance above the inferior tibiofibular ligament. The result is that the external malleolus is no longer held rigidly in position and the integrity of the joint is destroyed. As a result, the astragalus travels backwards, drawn by those strong muscles attached to tendo Achillis, and the foot is then pulled into extreme plantar flexion. In addition the foot is usually everted, the typical deformity being therefore backward displacement of the foot, its marked plantar flexion and eversion.

In my treatment of fractures I always prefer to have my masseuse with me when I do the reduction and put up the limb in the appropriate splints. You may say that this is waste of time, that she can only be an onlooker, and that her time is yet to come. To that I would reply that only in this way does she see the position of the limb after reduction and the details of the technique of the application of the splints. You will find that when you go into practice you will be taken to a fracture case some days after the original reduction, during which time the splints and bandages will have had ample time to become loose, and you will then be given the most vague and haphazard instructions from the doctor to "massage the limb." I suggest that in these circumstances it is difficult for you to grasp the whole purpose for which you have been called in.

The whole success of the treatment of a Pott's fracture depends upon the fracture being and remaining reduced. It is no good your massaging the leg if I have failed to reduce the deformity, nor if you allow it to slip back after a successful reduction. The point I wish to force home is that you must watch most carefully to see that the reduced position is maintained, or the deformity will recur, and your labors will then be in vain. There are many methods of putting up a Pott's fracture, and we each have our own ideas. Mine is a simple one, and is as follows: After the reduction under an anesthetic, the leg is put up on a back splint with a right angled foot piece with a properly graduated pad behind the heel, and a webbing strap over the lower end of the tibia. In this way the backward slip of the astragalus is prevented and the integrity of the ankle restored and maintained. The back splint does not reach to the knee, and the limb is treated with the knee flexed to 45 degrees in order to relax the muscles attached to the tendo Achillis. The apparatus is completed by the addition of two side splints fixed to the limb by webbing straps.

As far as I personally am concerned—and I am speaking merely from my own experience—I do not have the limb removed from the back splint for fourteen days, but I do have it massaged from the beginning. The side splints are removed, and the limb displayed on its back splint, to which it is fixed by two webbing straps, thus leaving quite useful access for massage. Why I am so particular about this detail is that after ten days we are approaching safety at the line of fracture. But during the first fourteen days the ankle is liable to slip back if removed from the splint, and in the interest of the patient and of yourselves it is not fair that you should be asked to take that risk. Therefore, at first you must be content with such massage as is possible with the access you are allowed. Afterwards the limb is transferred to a divided plaster cast, which can be taken on and off

for full massage. The points to which you should pay attention, are: 1. Always watch the position of the foot. 2. Always see that there is right angle flexion at the ankle. 3. Always be sure that the foot has not dropped back. 4. Always see that the sole of the foot and heel are flat on the foot piece.

Pott's fractures are very important ones indeed; their only difficulty lies in the reduction and that falls on our shoulders, and not on yours, but it is easy for you to allow the deformity to recur if the limb is removed from the splint too soon. The results of badly treated Pott's fractures are really lamentable, with severe traumatic flat foot as a crippling deformity.

FRACTURES OF THE TIBIA

The next group with which I would deal is that of the fractures of the tibia, and I would remind you that all fractures of the long bones fall into one of two classes, viz., transverse and oblique. As far as we are concerned, these present two entirely different propositions, and in them your access to the leg varies much. The transverse fracture is a break at right angles to the long axis of the bone accompanied by overlapping of the fragments due to the muscular spasm. In their treatment we need only to reduce the overlapping and to obtain an anatomical alignment of the bone, and further to protect the limb from any violence that might separate the fragments again. The oblique fracture on the other hand is one in which there is an immediate return to the overlapping position when the pull is released, and it is evident therefore that continuous traction is needed. This is done by a strapping extension apparatus in conjunction with a Thomas's knee splint, with the details of which you are all doubtless conversant. You will realize that in these cases access to the limb is entirely denied you, and your active participation in the treatment is long delayed.

With the transverse fracture, on the contrary, you are on the scene from the very beginning, the treatment consisting of retention of the limb in a box splint, i. e., a back splint with foot piece and two side splints. And more important still, you are on the scene when we are not, for the doctor in charge cannot possibly be present every time the massage is done. It is obvious, therefore, that to a large extent the progress of the case is in your hands, and yet you must remember that we have to bear all the responsibility. You remove the splints and you replace them afterwards. I wonder if they are always replaced in precisely the same way as before. I very much doubt it. Although I have said that once you have reduced the fracture your only care is to preserve the limb from further injury, that is not all the story. The fragments being brought end to end, and the overlapping overcome, there are six angular deformities which will call for constant care and attention. There may be angulation forwards, backwards, and to either side. These in themselves mean little, but in their far-reaching effect on function afterward, they demand the highest respect. It is all a question of the weight-bearing mechanics of the limb. Normally, the axis of weight bearing passes through the head of the femur, the knee joint, through the tibia to the ankle, and so to the foot. In a fracture of the tibia which has been allowed to heal in an angular deformity, there will result an interference with the weight-bearing axis, and crippling deformities, as genu recurvatum, genu valgum, and flat foot will be the patient's heritage. In addition the lower fragment may be rotated into eversion or inversion, and similar disturbances in the function of the foot will result. All these six deformities at the line of fracture can be corrected by the intelligent use of small pads. Let me describe to you the problem as it will concern you. You will find on your first attendance on such a case that the limb is on a back splint with the foot firmly and evenly in contact with the foot piece, and the heel protected from rubbing behind by a small pad under the tendo Achillis. The splint is fixed by two or three webbing straps. Two side splints are in position, also held by two straps, and some angulation being present, one, two, or three pads may be seen between the limb and one of the side splints. You remove the whole apparatus and massage the leg, only to find when you are finished that you have no idea of where the pads were, and how they were arranged. That is bad enough, but supposing you have never been taught the reason for the pads, and the methods by which you recognize their necessity? How many of my audience are confident of saying when there is any angular deformity in a fractured tibia? As a matter of fact, you should not always blindly replace splints, pads, and straps as you found them, but should act as the position of the limb demands. Let me therefore describe to you how you judge whether a fractured tibia is properly aligned. Stand at the foot of your patient and looking up the whole length of the leg see that the following bony points are in a dead straight line: 1. The inner surface of the metatarsophalangeal joint. 2. The inner border of the patella. 3. The tip of the anterior superior spine of the ilium. Then sit beside the limb so that the eyes are on the level with the bone and you will readily appreciate if there be any sagging of the fragments toward the splint, or any tilting forwards under the skin. Finally, I would ask you to remember that so trivial a thing as a small pad is perhaps the most important thing in the whole treatment of a fractured tibia.

THE FRACTURED PATELLA

All fractures of the patella should be operated on, for the express purpose of allowing movement at the earliest opportunity. The only aspect of the question which interests us in this connection is how soon massage and movement are allowed in a fractured patella that has been wired. I would ask you to notice that this is the first time I have mentioned the word movement, and perhaps I may be allowed to digress for a moment to discuss this point. I would remind you that there are three types of movement. 1. So called passive movement. 2. Voluntary movement. 3. Active movement. I am not sufficiently conversant with your modern teaching to know what is said about passive movement, but to me it is anathema. It may have a very small place in massage, but so small that there are very few qualified to use it, and it would be safer to eliminate it altogether. Voluntary movement is the contraction of muscles or groups of muscles without causing movement in the appropriate joints. In fractures of the patella after operation, voluntary movements should be encouraged as soon as possible, so as to cause the patella to ride over the femur. The patella should also be moved from side to side across the femur to prevent any possibility of the callus from the patella sticking to any small abrasion of the articular surface of the femur. Active flexion of the knee should be allowed on the tenth day, and many of us put our patients on slings with counterbalanced weights so that the active movements may be as strong as possible.

I will not now introduce you to fractures of the femur; they present far too large a subject for a short lecture.

THE COLLE'S FRACTURE

In the forearm the most important fracture is the Colle's, our old friend that will go down to history as "the fracture of the slippery Wednesday." On that occasion over 100 Colle's were seen at St. Mary's Hospital, and I myself saw and treated forty-nine of them. Colle's fractures are very similar to Pott's in the leg. Together they form a very large proportion of the total fractures; each takes its importance from the associated joint involvement though the joint surfaces are fractured in neither, and lastly their crippling effect when imperfectly treated, as they so often are. These defects in function, following Colle's fractures, are disastrous and totally unnecessary, for it is a simple fracture and very easy to treat.

Just as I dealt with the mechanics of the Pott's so I will deal with those of the Colle's. The latter is a fracture through the lower end of the radius produced by a fall on the outstretched hand, and all the difficulties surrounding it are centered in the one fact, viz., that it is an impacted fracture, the fragments being driven one into the other and firmly fixed. Unfortunately they are impacted in a bad position so that the treatment must include primarily disimpaction. The deformities are as follows: the lower fragment is displaced backwards and upwards, and it is rotated so that its lower articular surface looks backwards as well as downwards, and also rotated into radial deviation. Even after a satisfactory reduction, the radial deviation is apt to persist unless carefully watched.

There are several ways of treating these fractures, but the one I adopt is the one which a recent text-book of massage teaches. After the reduction the hand is put up in a plaster of Paris bandage in extreme flexion at the wrist, and in extreme ulnar deviation, and left in this for ten days. It is then removed from the plaster and placed in a Robert Jones short cock-up splint in full dorsiflexion. It is at this stage that you are introduced to a Colle's fracture, and there is only one thing upon which to comment, and I wish to emphasize it most strongly. You will remember that the short cock-up splint is a small metal trough which fits the anterior surface of the lower end of the forearm. Attached to it is a metal bar carrying two flanges, one to grip and steady the wrist, and another to do the same for the palm of the hand. The bar is bent at the wrist to about 80 degrees. The object of the splint is to procure and maintain the maximum degree of dorsiflexion possible at the wrist. Those of you who are familiar with these splints will agree that it is quite easy to apply them in such a way that not a single degree of dorsiflexion is produced. That is the crux of the whole matter, and that is the point to which you must pay the most active attention when you are replacing the splint after massage. The first few turns of the bandage must be around the wrist, and you must be sure that the wrist is forced down on to the splint, otherwise the wrist will be left off the splint, and the position will be destroyed. Don't bandage any part of the forearm or hand till you are satisfied that the first few turns have really thrust the wrist firmly home on to the splint.

FRACTURES OF THE FOREARM

The bones of the forearm are frequently broken together, and restoration of function depends just as much on obtaining supination and pronation as flexion and extension. One of the complications of these fractures is the condition we call cross union, in which the union of the two bones to each other destroys supination and pronation. Let us examine a cross section of the forearm with the splints shown in position. Unless the splints overlap the lateral surfaces of the forearm, the bandage in passing from one splint to the other will be in intimate contact with the limb and so will exert lateral pressure, and in this way will be forcing the four fragments together—just the state of affairs we wish to avoid. It is imperative, therefore, to use splints which are wider than the forearm, and consequently overlap, allowing a definite space between the bandage and the lateral aspects of the limb. In this way the pressure is exerted only in one axis, from front to back, thus tending to separate the ulna from the radius. Always ensure that this condition is fulfilled when you are replacing the splints after massage.

There are only two further fractures I would touch on, the first being those of the elbow in children under the age of twelve. I notice that it is taught in some of your massage text-books that these fractures in children should be massaged. There is no more fallacious or dangerous teaching. The masseuse has no place whatsoever in the treatment of these fractures, which should be something of which they have heard, but never seen. I would recall that I said in children under twelve; after that age and in adults massage takes its normal place.

As a last word, I come to fractures of the humerus, and I must admit that I find them infinitely more difficult than any other. Perhaps the factor which contributes more than anything to their difficulty is that they are regarded as fractures which can be treated as walking cases, and I feel convinced that this is fundamentally wrong, and responsible for most of the bad results. In the same way your difficulties are well marked in the early stages, and much of your massage must be done with the arm still in a splint. When we discuss movement in those cases in which the fracture is near the shoulder, then we appreciate the real trouble. Nevertheless, I believe that that difficulty has very largely been overcome by the most ingenious methods introduced by our distinguished chairman this evening, Mrs. Guthrie Smith, who, by utilizing a system of slings, counterbalanced by weights, obtains free and painless movements of a strictly active type, and I am convinced that her method will be received with universal approval.

I have attempted to give you a very brief résumé of some of the difficulties you may encounter when you go, in course of time, to start your work on your own in town or country. You will have been, of course, well grounded in the general principles of your calling, but I hope I may have succeeded in introducing to you some of the problems that only experience can bring you, and I hope further that what I have said may be of use to you in the days to come.

Physiotherapy in Colle's Fracture of the Radius

By Hugh T. Jones, M.D.

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The importance of proper Physiotherapy in the early reestablishment of function following a Colle's fracture is to be stressed; first, because early return of function often means more complete restoration of function, and second, because early return of function is to be desired in this industrial age. It is important that the physiotherapist should understand what constitutes a Colle's fracture and particularly know the conditions in the case which is to be treated. The physiotherapist should review the case history, learn from the patient how the injury was sustained, and study the roentgenograms as they appeared before and after the reduction of the fracture.

A Colle's fracture is usually sustained by a fall on the open hand, the force of which drives the distal end of the radius toward the dorsum of the lower part of the forearm and causes impaction of one fragment into the other to a variable extent. The injury to the bone is well shown in Figure 1, but the bone is not the only structure injured. Blood from the broken bone and lacerated soft tissues is extravasated into the surrounding region, blood vessels and nerves may be traumatized, the tendons with their tendon sheaths are undoubtedly often injured, and ligaments are strained or actually torn. The main force of the blow is transmitted mainly from the hand to the radius, and when the radius gives way and is shortened without fracture of the ulna, something must happen to the mechanism which connects the lower end of the radius and ulna. In order that normal pronation and supination may take place, the radius must roll on the ulna and at the distal end of these two bones there is the distal radio-ulnar joint.

FIG. 1

FIG. 3

FIG. 2

Fig. 1. Colle's fracture. Typical displacement of the distal fragment and impaction are shown.

Fig. 2. Triangular fibrocartilage of the wrist-joint. (Lasher, W.W.: Cartilage Injuries. A clinical study. Jour. Bone and Joint Surg., 1928, x, 587-593).

Fig. 3. Colle's fracture reduced.

Figure 2 illustrates the mechanics of the radio-ulnar joint, which allows the distal end of the radius to roll on the ulna without loss of stability, and without a tendency for the two bones to separate. The triangular fibrocartilage which is so important is attached by its apex to the styloid process of the ulna and by its base to the side of the distal end of the radius. If the radius breaks and is shortened, the triangular fibrocartilage transmits a pull on its attachment to the styloid process of the ulna and this process is often broken off.

The surgeon usually prefers to treat the patient himself during the first week. Accurate replacement of the fragments (Fig. 3) usually brings immediate relief from pain because nerves, blood vessels, and tendons are not being stretched abnormally. Continued pain means to the surgeon either that the parts are probably not in normal relationship, or that the splints are obstructing circulation. Obstructed circulation is very serious because of the danger of ischemic paralysis. In ordinary cases of Colle's fracture, the patient derives much comfort if the surgeon will remove the splints twice during the first week, and while supporting the fracture, massage the extremity with alcohol by gently stroking toward the elbow. Following this, the patient may be encouraged to close the fingers and thumb to make a fist. This is designed to help prevent adhesions of the tendons.

Padded dorsal and volar splints may be used during the first week, or the volar splint alone may be used in uncomplicated cases without extreme impaction or comminution, if copious padding is used to prevent obstruction to circulation. The splint (Fig. 4) is cut from a wet strip of plaster bandage, with a piece of thick cotton flannel on the side next to the skin. Before the plaster sets, the splint is bandaged to the forearm with paper bandages, and while the plaster sets, the splint is molded to support the arched volar aspect of the lower part of the radius; at the same time the patient closes the fingers and the wrist is held in moderate flexion and ulnar deviation. Ulnar deviation is important because one of the common deformities following a Colle's fracture is radial deviation of the hand due to shortening of the radius from impaction at the time of injury. Experience has also shown that pronation and flexion of the wrist favor retention of the fracture in reduction. In addition to supporting the arched volar surface of the lower fifth of the shaft of the radius, this splint allows use of the fingers and thumb (Fig. 5).

In the second week, if the physiotherapist understands

Fig. 4. Volar plaster splint for cases of uncomplicated Colle's fracture.

Fig. 5. Volar plaster splint molded to support the fracture.

Fig. 6. Method of supporting Colle's fracture to prevent displacement of fragments. The thumb is placed on the distal fragment, and the four fingers support the shaft of the radius.

FIG. 4

FIG. 5

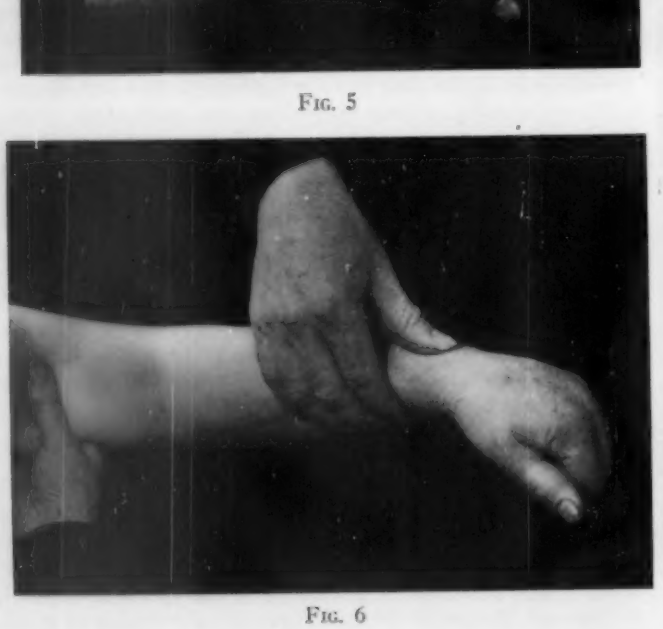

FIG. 6

the mechanics of the production of the fracture, its reduction, and manner of retention in position, physiotherapeutic aid may be instituted. Hippocrates once said, "It is an awkward and disgraceful thing to use mechanical means in an unmechanical way," and what he said in ancient Greece is true here today in the management of what is so often considered such a simple condition as a Colle's fracture.

Physiotherapy for the second week consists first in the application of heat, conveniently given by baking. Following this, gentle massage of the fingers, hand, and forearm may be given to reduce the swelling and to aid in the absorption of the extravasated blood. Active and passive movements for the fingers and thumb are next in order. If the fracture is of the ordinary type, without extreme comminution and impaction, the forearm may be lifted from the splint, as shown in Figure 6, the shaft of the radius supported, with the four fingers and the thumb used to prevent displacement of the fractured end of the bone. The patient is to be encouraged to make a fist, but exercises are not to be violent enough to cause real pain. The thumb is to be approximated to each of the finger tips. If it is feared that displacement of the fragments is likely, the treatment during the second week may best be carried out on the plaster splint. During the second week active supination should be started; full supination is often the last motion to return. Motions of the wrist, except dorsiflexion, may be started later—in the second week. Dorsiflexion is not to be permitted because of the danger of displacement of the distal fragment. During the second week, the patient should be encouraged to use the fingers and thumb for small tasks when the splint is worn.

In the third week, the plaster support may best be changed to a moderate cock-up splint. In the more severe fractures, when displacement is feared, the moderate cock-up splint should not be used until the end of the third week. With this position, active flexion of the fingers can be better accomplished. In ordinary cases the whirlpool bath may be used to supply heat in the third week, and massage followed by exercises can be more thoroughly done than before.

In the fourth week, the heat, massage, and exercises are continued and one may hope to dispense with the splint at the end of the week.

It is well to remember certain injuries that occasionally accompany a Colle's fracture. The force of the original blow is transmitted to the shoulder joint and this joint may be injured. Then if the arm is carried in a sling for several weeks, painful limitation of motion of the shoulder joint is likely to result. Injury to the distal radio-ulnar joint may produce rather prolonged disability that is relieved only by a leather band about the wrist which binds the two bones together.

Physiotherapy for Spastic Paralysis

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In considering the reeducation of the patient with spastic paralysis, we have to think in terms of years, and because of the necessarily long period of time involved we must have an elastic program. A definite goal is necessary but the advance will be unobservable except as the distant rather than the near view is taken.

Medical advice is usually sought during the first few years of life. Difficulty with locomotion, and speech as well, causes the parent to hasten to someone for assistance. This discussion, therefore, shall be confined to the study and treatment of spasticity as manifested in the early years. The same type of training may be used for an adult except that the method of approach would of course be modified.

Before any work with the child is attempted, some observations are necessary. Attention must be given to the general appearance of the child, to his body mechanics, to his interest in cooperation as well as to the probable cooperation of the parents. Attention must be paid to the relative strength of the peroneal and tibial muscles as they influence the stability of the foot. A tight tendo Achillis is almost always in evidence, causing the child to walk on his toes. The crosslegged gait usually indicates contracted adductors. The flexor posture is typical and significant. In general, all flexors in extremities affected appear contracted, while there is a corresponding weakness of the opposing extensors. The ability of the hands to grasp or release an object is also of interest.

If the muscles concerned in speech also are involved, the parent should see a specialist concerning such training. Parenthetically, I may add that "Speech Training" by Blanton gives valuable suggestions. It will be found that the correct position of the tongue, teeth and lips can be learned in front of a mirror. The muscles controlling speech are subject to training just as those of the other parts of the body.

The Parent

The parent should keep the child under the care of a physiotherapist for a number of years. If for any reason this is impossible, then the parent himself must undertake the training of the child. The success or failure of the venture will depend on the personality of the one who is directing his education. Scarstrom[1] lists as some of the personal attributes necessary for a successful teacher of gymnastics, "patience, cheerfulness, good temper, keen sense of humor, ready wit, a level head, sympathy, sense of justice, self-control, leadership, vitality and a fairly good physique, quick eye and ear and a good voice." Surely one could not do with less when dealing with the problems of the spastic child. This type of person could gain the attention of the child through interest alone. Voluntary relaxed action initiated by the child himself is necessary in this particular kind of training.

If the parent is to undertake the work then he should not only observe all the training which is given to the child but he should give the treatments himself under the physiotherapist's supervision. He should understand something of his own mental attitude as well as that which he expects of the child. The happiness and self-reliance of the child is possible only as fear and dependence can be combated. He will need plenty of time to know the problems in connection with the length of the lesson and the fatigue which is always present. The parent should know the manner of presentation of the treatment proper, and the reasons for, or against, the use of heat and massage. He should study formal exercises as they are related to balance and posture, and the position in which they are given, as well as the question of speed and timing of exercises. Rhythm may be developed by means of marching, rhymes, and folk dances. Recreational features may be part of the games and exercises in the water, provided the parent can enter into the spirit of the play and at the same time keep in mind the purpose of each activity.

The Child

Often the spastic child is tense, excitable, overstimulated and much more easily fatigued than the average child. His surroundings should be pleasant and quiet. His rest hours should be just as religiously observed as his meals. The only way he can relax is through the leadership of one who can assure him of a feeling of understanding and at the same time imbue him with the courage to try the task which is only a little beyond. He cannot be hurried and an over-amount of urging toward correction only results in increased spasticity. It is impossible to command relaxation. Patience to repeat an exercise and wait, then repeat again a desired coordination, day after day, will steadily and surely gain results. It should be borne in mind that the process of learning a new exercise requires greater conscious effort than one already mastered and that it results in more fatigue. The simple motions of arms or legs are just as effective as those more complicated and have the added advantage of being more easily translated into rhythm. Through rhythmic repetition an exercise becomes so familiar to the child that it demands less and less conscious effort and will be transferred to the lower centers; and so the correct movement may become habitual. The rhythm must be comparatively slow at first. Speed is a progression of later development. Accuracy of position and range of movement are usually considered of more importance than speed. Full excursion at a joint is very necessary for progress in spastic paralysis. The parent is warned that it is unfair to the child, as well as defeating his own purpose, to confuse the child with too many instructions at one time, such as telling him how to carry his head, place his feet, and effect a balance in the erect position.

Special things which the parent should watch in regard to the child are fatigue, fear, and dependence. Experience has shown that he is more easily fatigued than other children and so cannot be hurried by giving too long treatments or by having them too frequently repeated. Shepard Ivory Franz advises as little as ten or fifteen minutes once or twice a day at first. Results should not be expected too soon; neither will there be

[1] Scarstrom, "Gymnastic Teaching," page 10.

a gain in ability without this daily work being continued over a comparatively long time. Mennell[2] suggests that "at the end of six months you may begin to see some good" from the systematic training. Staleness might be looked for just as in a football team under constant coaching. When this comes or when parent or child become discouraged all treatment of every kind should be omitted for a time. Then the whole problem may be attacked again with renewed zest. As to fear, our psychologists tell us that there are only two inborn fears, one is that of falling, and the other that of being startled by a loud noise. The first should receive attention from anyone directing a spastic child. The very nature of his disability makes frequent falls inevitable with the best of care. He should never be left in a position which may even seem dangerous to him. Particular care should be used, when he attempts to walk, that the floor is not slippery, and that all sharp cornered furniture is out of the way. The cross-legged gait causes him to trip, so he should be supported at first. Self reliance is the keynote of work with spastic children. The earlier the training in independence is begun, the better the final results. Teaching the child to feed himself at a low table, where there is little danger from a fall, is one of the first things to which the parent may give his attention. He is taught to dress himself, first, by having him only pull his clothes on neatly. Later, the lacing of shoes, and the buttoning of buttons will be transferred to actual use, as a result of practice with the Montessori frames. Much time is required to help the child attain the motor control necessary to take care of himself. Even if he can move about only with a walker or kiddie car, drinking cups, toys and wraps should be within his reach. The parent should be impressed with the value of training in independent action. If given an opportunity, the child naturally enjoys doing things for himself.

The parents also are warned against discussion of the child's difficulties in his presence. He already realizes his inferiority and the constant anxiety of his parents serves to make him abnormally self-conscious and oversensitive. By understanding his difficulties, by using experience in solving his problems, and by sympathetic but firm guidance, he is directed in the way which seems to promise most for his future development.

THE TREATMENT

There are probably no two children with spastic paralysis whose treatments should be given in the same way. This must of necessity be worked out for the individual case. After reading the child's medical history and becoming familiar with the special abnormalities which it is desired to correct, the physiotherapist will plan an elastic program which includes not only the present work for the child but which will progressively guide his future work as well. The parent should understand not only how to give the training to his child but the reason for each part of the plan as well. If the parent understands the correctional value of each exercise, he will give them in a much more intelligent manner than if he were blindly following written orders. No amount of independent observation can take the place of experience in giving the treatments under supervision. The parent may feel entirely familiar with every part of the procedure, yet may give an exercise in such a position that the child is using the wrong muscles. A common example of this would be abducton of the leg in a side-lying position with the hip slightly flexed. In this position the flexors of the hip would be used somewhat and this can be avoided by requiring extreme extension at the hip throughout the exercise. The time the parent may need to spend in learning to give the exercises will vary with the difficulty of the case and with the extent, involvement and degree of cooperation which he can obtain from the child. When the physiotherapist and the physician in charge of the case are satisfied by the work of the parent with the child, they may be dismissed to go home and work for a few months. In some cases the parent may be given the care of the child for a longer period of time, but they are expected to return after a specified interval for a reexamination and check of the child's improvement. The plans for treatment may then be modified to suit the existing conditions at that time.

HEAT

Heat in some form is indicated as a preparation for exercises in order to relax the muscles and improve circulation. Extremes of either heat or cold are stimulating, so these should be avoided. If baking is used, the apparatus should be set at sufficient distance to insure only a moderate amount of heat and the time should not be too prolonged. Children subject to spasmodic contractions of the extremities should not be left alone during the treatment. The warm saline bath is convenient and has been found satisfactory in a great variety of cases. An inclined canvas platform, so the patient may lie down with the head out of the water, may be used. A belt or harness arrangement may be used also so that both hands may be used in giving the treatment. The temperature of the room should be moderately warm, as both the massage and the exercises will be given before the child is dressed.

MASSAGE

The purpose of massage is to effect greater relaxation and to increase circulation. Some advocate the use of massage while others consider it of doubtful value for spastic patients. Mennell says, "If you apply massage to a case of spastic paralysis, what effect do you hope to secure? There is a state of overirritation as it is, and you must aim at quieting this down and that can never be done by surface stimulation. You do not secure relaxation of a muscle in spastic paralysis as a result of surface stimulation; the reflex is inadequate." However, each case must be a law unto itself. If the massage seems to increase the excitability of the patient then, of course, its use would be contraindicated. The part of the body massaged is also of importance. A child may relax under massage of the back, when massage of the affected extremity would prove too irritating and result in clonus. If massage is done at all, all percussion should be avoided, and it should be done with a slow, even rhythm.

EXERCISE AND RELAXATION

The purpose of formal exercises is to obtain voluntary control of the musculature, relaxation of the spastic muscles and contraction of their antagonists.

This has been studied by Mennell. In substance he says that one must get voluntary contraction of the muscle which is contracted before one can produce voluntary relaxation. This is not carried out as an exercise, but for the purpose of assisting the child to gain control of that muscle group. Then when the child has learned to relax, voluntary contraction of the antagonists is carried out as an exercise. At first the action of only one joint is all the child should attempt. Later he may coordinate the action of two joints in an arm or a leg. An exercise is made more difficult by using both legs or both arms at the same time. Progressions may be made to the use of arm and leg of the same side of the body, then

[2]Mennell, Spastic Paralysis—Causes and Treatment, 1927, PHYSIOTHERAPY REVIEW, March,

the opposite sides of the body. Action may be made more complicated by having the extremities move in the same direction; then in the opposite direction. Progression in the matter of position in exercises may be made from those taken on a table, to those taken sitting, and then to those taken standing.

The force of gravity is used to add to, or to detract from, the difficulty of an exercise. This may be worked out by changing the positions in which an exercise is given, whether side lying, sitting, prone or supine. The timing of an exercise must be regulated according to the ability of the child to relax. Whether an exercise is assisted, guided, or resisted, will depend on the needs in the individual case.

WALKING

The spastic child must develop the ability to walk by constant and repeated effort. The cross-legged position causes him to trip himself at the first stop, and the insecurity of trying to balance with joints half flexed convinces him that the task is impossible. Support may be given by means of a walker, with a belt and saddle arrangement, which will help carry his weight. A bridge with railing, an overhead trolley, or a harness support may also be used to keep him from falling. A long mirror is especially helpful that he may watch his feet in it instead of looking downward. He should first learn to step with his feet far enough apart to avoid tripping. Learning to stand alone is usually more difficult than progressing forward. A horizontal ladder, with a tape drawn through the center, may be used to teach him to lift his feet and also to take steps of an even length. The position of the feet may next receive attention. An orthopedic physician should see that the shoes are well fitted and balanced so that they correct the child's disability in so far as shoes can assist. Sometimes a higher heel may be placed on the child's shoe; then, as he becomes accustomed to having his heel touch the ground, the height may be reduced, a lift at a time. The tendency toward valgus or varus may also be treated by having the child practice his walking on slanting boards, with a guarding board at the lower edge of the inclination.

POSTURE

Training in posture may be woven into formal exercises. The parent should understand the way to have the child maintain a correct bodily alignment which involves the least strain from gravity. Not only is correct placing of the foot necessary, but attention must be given to the relative position of knees, hips, abdomen and back. There should be disassociation of the upper from the lower back muscles with expansion of the chest and erect position of the head. Wall exercises, as advised by Dr. Armin Klein, give the child some support, and at the same time assist in flattening the back. The feet may be placed a few inches from the wall so that he may be able to "sit down against the wall"; then, as better muscular control is gained, the feet may be placed nearer and nearer the wall and so that the body may gain its erect alignment from this starting position. When the child can stand with shoulders, head and back in good position, he may take a few steps from the wall and attempt to hold the corrected posture. The lying down position with a roll under the greatest convexity of the shoulders is less strain for the child, and may be used for about ten minutes three times daily. An element of training in posture which must not be overlooked is that there must be frequent change of position to avoid fatigue. Prolonged sitting encourages relaxation of abdominal and gluteal muscles, and with this, forward flexion of the entire spine, associated with a drooping head and depression of the chest, all of which must be overcome. This flexor posture is of such frequent occurrence in spastic children that it constitutes a significant diagnostic point. A tendency to scoliosis may develop in the hemiplegic type of patient in whom there is an uneven base from contracted flexors of the hip or tendo Achillis. No modern parent need be told that children are no longer instructed to "throw their shoulders back." They are taught to align themselves with the wall and to bring their weight forward on to the balls of the feet. Posture may then be taught to the three-year-old as well as to the one who is thirteen.

RHYTHM

A child must use much conscious effort the first few times he does an exercise, but as his kinesthetic sense becomes trained, less mental and physical effort are required and the response becomes more nearly automatic. Constant repetition of an exercise in the rhythm of poetry or music assists in weaving the desired response into the nervous system. The psychologic value of this association has been used for several years by Miss Mary Trainor in her work with spastic patients at the Boston Children's Hospital. Several of the rhymes used in the accompanying table are those to which the children in her clinic are accustomed. This type of work is particularly well adapted to the training of hands. As noted before, the response of a spastic child is comparatively slow and forcing in speed only results in clonus. A child who can walk may be trained in rhythm by marching with other children. Phonograph or victrola records, as well as certain radio selections, may be useful in the teaching of exercises. Folk dances and singing games may be used profitably by some children and will add interest and variety to their treatment.

SWIMMING*

Swimming may be classed as work or recreation, depending on the way it is used by the one who is directing the work with the spastic child. The purpose of using the pool is that support is given by the water. The movement of arms or legs is freer and there is a better opportunity for relaxation. There are also coordinations which are effective in the water that would be impossible outside. In order to get the relaxation we desire, warm water is necessary. The pool at the Orthopaedic Hospital School in Los Angeles is kept between 90° and 92° F. Either an outdoor or an indoor pool may be used, depending on the climate and season. If neither of these is available, then a galvanized stock tank may be used This could be fitted with hot and cold water and a drain. A bathtub is suitable for exercises only for the very small child. Support when in the water is particularly necessary for the spastic child. It is also much easier to give the exercises if the child is partially supported. He may rest on an inclined canvas attached to the edge of the pool with the upper part of the body firmly held with straps, allowing the legs to float. A trolley with suspended belt leaves the child's body quite free for exercises. A float may be made of bamboo poles, with bladders at each of the three corners. Inner tubes from cars may also be used for partial support. Formal exercises as given in the chart for table work may be adapted to training in the water.

Strokes must be worked out individually in order to overcome the contractions of the spastic muscles.

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*Lowman & Roeminger, The Use of the Therapeutic Pool. Plasteridge, Alice, Physiotherapy and the Swimming Pool. 1928. PHYSIOTHERAPY REVIEW, Aug.

RECREATION

In so far as possible the first games played should involve the larger movements. Large toys, which the child must carry in his arms and which necessitate the use of two hands rather than one, are desirable; such articles are balls six inches in diameter and large wooden blocks for building. These need not necessarily be heavy in weight; however, a child enjoys handling things which test his strength. Boxes of groceries which are bought in quantities assist him in playing store. The position in which games may be played is also of interest. Sitting on the floor, or even riding on a kiddie car, naturally favors flexion contractures of the hip and knee and, as stated in "Kinesiology" by Bowen and McKenzie, "the more a muscle is used in shortened condition, the shorter it has a tendency to become." Hammering nails which have already been started into wooden blocks may be used as a step toward the handling of simple tools. Quoits may be played with rubber horseshoes, and by gauging the distance from the goal the child may be taught first to use extension of the wrist, then extension of the elbow and later movement of the whole arm. If approached in the spirit of play the child will find amusement in the Montessori frames. Individual action of the fingers may be helped by using a typewriter. A child's hours of play may be educational in content but their direction should not be too evident.

Table 1—EXAMINATION OF SPASTIC CHILD

*(Points to consider before beginning exercise program)**

General appearance	Body mechanics	Cooperation (child)	Cooperation (parent)
Manner of locomotion 1. Cannot walk. 2. Can walk with help. 3. Can walk with cane. 4. Can walk alone. *Part affected* 1. Lower part of body, pariplegia. 2. One side, hemiplegia. 3. Whole body, diplegia. *Condition of child* 1. Fat, thin or normal. 2. Extremities warm or cold. 3. Body good color or pale. 4. Average size or undersize. *Speech* 1. Cannot speak but can follow directions. 2. Understood by parents. 3. Speech slightly affected. 4. Speech normal.	1. Anteroposterior position: a. Erect posture. b. Flexor posture. 2. Scoliosis: *Contractures* 1. Knee. 2. Hip. 3. Fingers. 4. Wrist. 5. Elbow. 6. Shoulder. 7. Ankle. *Feet and ankles* 1. Inversion. 2. Eversion. 3. Longitudinal arch. 4. Anterior arch. 5. Ankle extended.	*Degree of muscular control* *Movements* 1. Random. 2. Fair control. *Ability to balance* 1. When changing lying position. 2. When standing. *Ability to follow directions* 1. Can take positions requested. 2. Cannot take positions requested. *Degree of mental control* Will to cooperate: 1. Interested easily. 2. Difficult to gain attention. *Self reliance* 1. Comprehends directions. 2. Independent or dependent. *Mental attitude* 1. Nervous or calm. 2. Sensitive or insensitive. 3. Careless or careful. 4. Obedient or disobedient. 5. Fearful or courageous. 6. Happy or unhappy.	1. Patient or impatient. 2. Attitude hopeful or hopeless. 3. Can or cannot give child personal training. 4. Intelligent or unintelligent. 5. Can or cannot gain the cooperation of the child. 6. Willing or unwilling to spend time on child's training. 7. Encourages or discourages independence in the child. 8. Willing or unwilling to make the best of things.

*Points describing each case may be checked.

Table 2—BALANCE

Position	Task	Suggestions
Supine.	Turn to prone position alone and reverse.	This may be tried first on the floor, later on table.
Sitting.	Sit alone on low chair, one foot behind, in position so standing may be more easily achieved.	Keep chest high, chin in and back straight, come to standing position with balance.
Standing.	Standing alone, attempt to balance in good alignment.	This is worth many trials because on this ability depends balance in walking.
Feet spread.	Attempt to achieve a position which favors abductors instead of adductors.	Straighten knees, try to flatten back and pull the chin in.
A long step.	Stand with one foot ahead of the other and on either side of a tape.	Take same position and reverse and get good alignment.
Walking.	Continue as in above exercise.	Attempt very little at a time.
One foot stand.	Stand on one foot with other raised to the side, knees straight. Reverse.	Support may be necessary at first.
One foot and one arm raised.	Same as above and raise arm on same side, elbow straight, arm shoulder-high.	Stretch body tall, chin in, chest high, back flat.
Right foot and opposite arm raised.	Endeavor to keep all joints straight and body well poised.	All of these positions are in the lateral plane only and help to balance the weight between the two feet.
Feet spread, touch both hands to toes of one foot.	As a final test of balance, stretch the hamstrings by a forward and downward bend.	If the child can do this exercise and regain his balance in the upright positions he will feel he has done very well.
Stand on heels.	Lift the anterior portion of the feet.	This is very difficult.

Table 3—WALKING

Device	Description	Suggestions
Walker with support.	Built same as other walker but has "Y" support with belt to keep the child in correct position.	Built to scale according to size of patient.
Walker.	May be made with four legs, castors on the two in front and felt on the two in back. Arm rests at side help support child.	Same walker may be used as above.
Bridge.	Parallel bars the right height for child's arms. This may be built similar to the parallel bars used in a gymnasium but smaller.	Floor may be of wood, with rails of lead pipe. Smooth wood rails may be substituted.
Overhead trolley.	Similar in form to that used in swimming pools but arranged for vertical rather than for horizontal support. Very convenient.	Best used in conjunction with long mirror.
Harness support.	May be made similar to that used for keeping hold of children of two years of age in crowded stores. Support from behind.	Children naturally lean toward the source of support.
Horizontal ladder.	Purpose is to increase lift of feet and legs. Rungs should be not too far apart. A tape may be used to avoid crossing of the feet.	Should also help in attaining steps of even length. This is used between one and six inches from the floor.
Steps.	These may be built similar to bridge except that here there are three steps up and three steps down. White line is placed in the center.	Purpose of white line is to keep feet from crossing.
Slanting boards.	Make fairly wide and with guarding board at lower edge. These would of course be built so as to help correct whichever condition the child might have.	Used for definite varus or valgus deformity.
Cane with broad base.	This is made with base as large as one foot, tapered to size of cane.	This should not be of too heavy material but made very strong so it is quite secure.

Further suggestions for teaching the child

Shoes should be well fitting and comfortable. A high heel may be placed on a shoe and removed a lift at a time.

Avoid crossing the feet by walking on either side of a strip of tape, a chalk line or a crack in the sidewalk.

Do not fatigue the child by calling attention to too many things at once, nor by continuing practice more than a very few minutes.

Do not hurry the child by voice or action. All sharp cornered furniture should be out of the way.

Remove fear of a fall and child can work on form.

At first take only a step or two between two persons, toes straight ahead. Good posture, balance, coordination and rhythm are all necessary.

A highly polished floor should be avoided when teaching a child to walk. So also should slippery rugs which would increase the difficulty of walking.

Table 4—TRAINING IN RHYTHM

Plan	Suggestion	Application
Tapping.	Like the old-fashioned violinist who kept time with his foot.	Emphasize the lift so as to lengthen the tendo Achillis (foot).
Drum.	Use as reward for learning march time.	Beat table with padded sticks (hand) until correct time has been learned.
Records or radio.	Use the best of these for marking time with either the hands or feet.	As a later development, formal exercises may be done to this rhythm.
Marching.	Practice marching by threes, hand held on either side.	Start rather slowly but with a brisk step in which the rhythm is accented.
Singing games.	The days of the week, "This is the way we wash our clothes," etc.	Go through the motions with both hands working together.
Folk dances.	"Clap, clap, bow," and so forth. Those involving very simple steps at first, later more difficult.	If a child enjoys these, allow him to do them even if not done perfectly.
Hopping and skipping.	These activities may be learned separately or as a part of folk dances.	Training in rhythm and better muscular control should proceed together for the spastic child.

Table 5—ACTIVITIES FOR SPASTIC CHILDREN

List of games and amusements		Suggestions
1. Sand tables. 2. Blocks: a. Building. b. Mozaic. c. Spelling. d. Picture. e. Pattern. f. A. B. C. 3. Magic drawing book. 4. Music box (to wind). 5. Balls: a. Football. b. Basket ball. c. Play ball. d. Sport ball. 6. Toss games: a. Ring toss. b. Horseshoe toss. c. Ball and waste basket.	7. Boards: a. Spelling board. b. Reading board. c. Counting board. d. Peg board. 8. Montessori frames: a. Buttoning. b. Lacing. 9. Tracing slates. 10. Stencils. 11. Cut outs. 12. Machano. 13. Puppet shows. 14. Jack stones. 15. Rubber stamps (placing of letters). 16. "Junior play golf." 17. "Busy kiddy" rings and trapese hang in doorway. 18. Jumping rope. 19. Tools. 20. Typewriter.	All activities must be adapted to the physical and mental ability of the child. The child's interests will be influenced by his environment as well as his age and sex. In general all the larger muscles should be trained first, then the finer coordinations would come later. Because of this the larger balls which are carried in the arms are best. The blocks should also be large enough to make the use of both hands necessary. Whatever the need, some activity can be found which is both pleasing to the child and satisfying in regard to the nervous and mental reeducation which he is receiving.
Musical Instruments		
a. Accordion. b. Flute.	c. Drum. d. Mouth organ.	e. Castinets—with handle. f. Piano.

Table 6—READING OF INTEREST

For the Parent

Finger plays.....Emilie Paulsson
Speech training for children.....Blanton and Blanton
Correction of speech defects.....Helen Pephard
Nervous and mental reeducation.....Shepard Ivory Franz
Play life.....Palmer
Psychological care of infant and child.....Watson
Posture training (booklet by Klein).....
.....Children's Bureau, Washington, D. C.

For the Physiotherapist

Muscle function.....Wilhelmine G. Wright
Body mechanics.....Thomas and Goldthwaite

Martin, E. G.: Physiology of muscle innervation. Jour. Bone and Joint Surg., 1928, x, 82-88.
Simon, H. T.: Treatment with special reference to Stoffel operation. New Orleans Med. and Surg. Jour., 1928, lxxx, 622-627.
Fairback, H. A. T.: The treatmment of spastic paralysis in children. Brit. Med. Jour., 1926, i, 776-779.
Hempelman, T. C.: Cerebral birth paralysis. Am. Jour. Dis. Child., 1927, iii, 296-299.
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Human Senses Have Many Limits

By Louis K. Poyntz, M. D.

We have certain specialized senses and we are apt to regard them as being the height of perfection as instruments of perception in their respective fields. However, that is not so. True, they have reached a degree of refinement that is really marvelous, but let us not assume they are perfect. As an example, our ears make possible the detection of sound. Sound is conveyed to our ears as waves in the air. Every sound is produced by some material thing in motion and is conveyed through matter. Sound cannot pass through a vacuum but is propagated as a series of waves in some tangible medium. If these waves come very rapidly they produce the sensation of high pitched notes, whereas if they come less frequently we appreciate them as lower notes. But there is a definite limit to what our ears will register. If the waves come at the rate of 16 per second we can hear them, but lower than that produces no "sound." On the other hand, if the rate of vibration exceeds 20,000 per second, then all seems silent. Consequently our ears are attuned to only those vibrations between 16 and 20,000 per second. If there is a "noise" with a higher frequency than this we cannot tell it by our ears. Now, we know that there are sound waves both higher in frequency and lower in frequency than the limits of the human ear, so that we must admit that as an instrument of reception it is useful only within certain definite limits. Albert Loomis of Tuxedo Park, N. Y., recently produced sound waves exceeding 300,000 per second. Of course, he could not hear them, but he could observe them by an instrument of man's creation—an artificial ear.

Then our sense of touch is considered by some persons as being ideal. Again it is not so. We appreciate the "touch" of a thing because of stimulations of delicate nerve endings in the skin. These sensory receivers, too, have definite limits. They can recognize a single blow or up to 600 blows a second. As an experiment you might place your finger on the surface of a slowly revolving cogwheel. Each cog strikes a separate blow which you can count. If the wheel is speeded up the blows come faster, but you can still recognize them as a series until the number of blows exceeds 600 a second. After that the wheel seems smooth. Therefore, we cannot trust our sense of touch too far, for it may deceive us, as our ears were found to be unreliable when the frequency of the sound waves was too fast.

But our eyes—we are apt to brag about our acuity of vision and even go so far as to deny the existence of anything we cannot see. Here again we become disillusioned when we observe the sharp limitations to which our eyes are confined. We perceive light because of stimulation of rather delicate nerve endings in the retina of the eye. Light waves are unlike sound waves in that they are vibrations in the ether and do not require any material substance for their propagation. If these ether vibrations happen to have a frequency of 400,000,000,000,000—four hundred thousand million—per second, they produce the sensation of red light when they strike the eye. If they have a lower frequency than this we cannot see them. Going further up the scale, if the frequency is just double this number we see violet light. In between these limits we have the colors of the rainbow and have the only light waves that can be seen.

When the ether vibrations are beyond these limits we have black light and this band is so enormous that it is staggering. On the one end with the frequency of a few thousands per second we have Hertzian, or wireless waves, whereas on the other end of the spectrum we have the cosmic rays. These cosmic rays are rays coming to us from outer space; they are light rays, but are of such high frequency that they will penetrate 19 feet of solid lead. In other words, they are extremely penetrating X-rays and are caused by the birth of new stars somewhere out in space. However, my object here is not a dissertation on the physics of light, but rather on the physiology of our special senses. I mention these facts to allow you to understand our limitations.

If one tried to make a chart of the different light waves, beginning from the lowest frequencies and passing on through to the highest frequencies, it would aid materially our understanding. Let us try to do this, and let us draw the band of visible light in the space of one foot and then put the other frequencies down according to the same scale. Well, the task would be hopeless, for we would require several million miles of paper to record such a spectrum. This means that of a range of light rays extending into millions of miles we know only one single foot. We must get all our visual impressions through this one foot because our eyes are developed to record only this brief amount. Still, in our dogmatic way we will still say, "You have got to show me."

Of course, we have been born into this little band of visible light, we have lived and learned in this narrow band; so it is not unnatural that we should look for more and still more information through this channel. Still, at the same time, let us not be so stupid as to deny that if something does not happen to fall within our little foot of territory it cannot exist somewhere else along the millions of miles we have not explored. It is from such revelations that the physicist becomes awed and frankly tells you that nothing is impossible that is not contrary to the laws of nature. He goes one step further and admits that he does not yet know all the laws of nature, and so he concedes that while a thing may seem improbable to the scientist it is not impossible. In other words, he admits that we do not know it all yet.

However, with the little that has been learned of the inner workings of physical laws we now have artificial ears that can register sounds too faint for human perception. Military engineers have developed an anti-aircraft gun that actually listens in for airplanes, aims itself and fires itself before an attentive listener has the slightest suspicion of the presence of an enemy aircraft. When the submarine menace terrorized the world scientists devised an artificial ear to aid in their detection. This they did by modeling it after the ear of a whale, but perfecting it a little better than nature has done. It worked. He has so improved on our sense of touch that by means of an instrument called a seismograph he can "feel" earthquakes thousands of miles away. He has so developed artificial eyes that he can "see" what is going on in the stars millions of miles away. The new photo-electric cells which have made broadcasting pictures possible are modeled on the human eye, but so highly specialized that we can see around corners, through walls and in the dark.

When man takes time to study the physical laws of nature he begins to "understand," and when he applies these laws he becomes an intelligent being. In medicine we are trying to learn these physical laws and apply them in treatment of ailing persons and it is gratifying to see that here, as elsewhere, results follow scientific application almost in direct proportion to the intelligence and skill of the physician.

Some Theory of Massage

By Beatrice E. Chadwick

After much research, I have come to the conclusion that the name Physiotherapy covers a multitude of sins as well as virtues. In spite of our united efforts to keep up our professional standard and make known our aims and objects, I am amazed at the lack of knowledge displayed by some who ought to know, at least, the rudiments of the different branches of Physiotherapy. Until this difficulty is overcome we shall continue to have patients come to us bearing ugly scars and much tissue destruction, in addition to the original disability, with a history of "the nurse attaching them to the diathermia machine while she went to eat her lunch," etc. In one instance the patient said he kicked over the machine in his efforts to free himself, being unable to make anyone hear his shouts. This patient had such a fear of diathermia that we were unable to overcome it and he refused to submit to that form of treatment, although his doctor had prescribed it.

Then recently, a charming lady applied for a position as physiotherapist. She was the widow of a medical man and said she had several years experience as a physiotherapist and believed herself to be well qualified for the work. She obtained the position and worked one day in the clinic, among several physiotherapists who fulfilled the requirements of the American Physiotherapy Association. She was not happy, she evidently realized her inadequate preparation for this work, and never returned.

Too many people fail to realize that scientific massage and remedial exercise is the most important and useful branch of Physiotherapy and that it takes some years to prepare for this branch alone. Many people seem to think that diathermia and ultra violet radiations cover the whole field. Electrotherapy, hydrotherapy, baking and radiations are very, very useful, but, after all, they are merely adjuncts to the massage and exercises. Fully ninety per cent of the patients need scientific massage and exercises, too, and what is more, soothing massage with a kindly, understanding personality behind it can be used many times where other agents cannot be introduced. Therefore, it is necessary for the masseuse to have a suitable personality and be so thoroughly educated in anatomy, physiology, myology, neurology, and all the other "ologies" pertaining to this work, that she knows exactly what lies under her hands, also the right way to stroke all fluids and waste products into their respective channels to be eliminated; thus she prepares a way for tissue repairing fluids and food.

The structure of all joints and the normal range of movements, as well as muscle function, must be clearly understood, so that a patient is grasped and handled in such a way as to gain his confidence. Her manner must be buoyant and hopeful and suggest progress.

The operator must be so familiar with the normal structure of the human body that she detects at once any deviation from this condition, and she must place weak or paralyzed limbs in a correct anatomical position as far as possible, to avoid deformity. She must understand the patient's injury, the nature and period of any operations, and carry out the doctor's prescribed treatment in an intelligent, conscientious manner, also be alert with eyes and ears to warn and guard the patient from injuring bone-graft or weak bone union, etc., and call the doctor's attention to any danger, if necessary.

She must also be capable of applying dressings and splints or appliances, to make the patient as comfortable as possible, and guard against infection.

Massage is a scientific manipulation of the soft tissues of the body. It is used in many different ways and differs from rubbing in having a definite therapeutic object in view.

Let us study the theory of these manipulations on the normal structure and functioning of organs, in given or different conditions, and what changes can be wrought by the different movements which prove beneficial and restorative. The effects of massage on the body may be summed up briefly in two ways: 1. Improvement in the circulation and fluids of the body; 2. Improvement wrought in nerve force in various parts of the body.

There are two means of producing these effects: 1. Direct mechanical effect on the tissues treated; 2. Indirect or reflex action.

Some treatments must be reflex and others mechanical. In reflex action, we aim to procure a soothing effect from cutaneous nerves to the nerve centres. If these nerves receive irritation and pain, they will also receive soothing effects and convey same to the central nervous system.

Soothing massage: A slow rhythmical effleurage will reduce muscle spasm in recent fractures. In chorea, spasmodic involuntary twitchings may be soothed and quieted by gentle, rhythmical effleurage on the patient's back for ten or twenty minutes.

Mechanical: In fractures of the femur, after re-union and much edema, effleurage is not enough to move this, so we use firm deep rolling and deep stroking towards the waste channels, a real mechanical process. It is very important to use rhythm and remember that there will also be some reflex effect.

The movements generally used in massage include: effleurage, surface stroking, deep stroking, petressage group, tapotment group, frictions, vibrations, deep breathing exercises, passive, assistive, active, resistive and re-educational exercises. All these movements have a specific effect on the skin, muscular system, circulatory system and nervous system. The operator must have a thorough and correct technique and know whether the massage is to be stimulating or soothing in character according to the type of patient and disability. The patient must be in a comfortable relaxed position and the operator must have everything necessary to give the treatment correctly, and no interruptions, so that she can concentrate and give the best that is in her with as little fatigue as possible.

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EDITORIAL

It is not surprising to find in a science as recent, effective and attractively accessible to the general public as physical therapy, the practice of many misuses and abuses in its appliance to disease.

Long before physical therapy was accepted as an important factor in the practice of medicine, the laity sought some form of treatment more tempting than medicine or surgery. Different cults, practicing the art of healing by massage, manipulations and so forth, originated and became vastly popular and with the advent of electrotherapy, its many branches and tremendous psychic effect upon the public, one of the medical profession's greatest sciences has been commercialized and indiscriminately practiced throughout the country.

The American Physiotherapy Association with its high standards, high ideals, and cooperation with the American Medical Association, is well qualified to assist in correcting this situation.

The skilful application of a definitely prescribed treatment and the insistent demand for a prescribed order from a physician will aid in bringing before the patient the importance of intelligent application of any form of physical therapy.

Many physicians and hospitals recognize our ability and efficiency but it is deplorable to find how many offices and hospitals, equipping departments, refer to the commercial house that supplied their apparatus to supply a technician, whose only knowledge of the treatment of disease is a short course in electrotherapy or they employ persons terming themselves physical therapists without necessary credentials. Recently in this locality a reputable hospital employed a chiropractor to fill a vacancy in their department.

A modern hospital would rise up in indignation at the slightest criticism of their general technique but apparently quite disregard the personnel of their physical therapy department. Such conditions could be corrected through our Bureau of Appointments if the American Physiotherapy Association were better known. The California Chapter's bulletin, issued to the members of the state medical association, seems an ideal way of cooperating with the medical profession. With the approval of the national executive committee a like bulletin to recognized hospitals presenting our qualifications and standards and the definite necessity of more rigid supervision in this particular science in the treatment of disease seems a very advisable procedure. The enormity of progress in the indiscreet practice of physical therapy requires the cooperation of our profession with the organized hospital associations as well as with the American Medical Association.

C. A. H.

WHAT'S IN A NAME?

Have you ever stopped to think what it would be like to be without one's own name? As members of the American Physiotherapy Association we have no name. Nature abhors a vacuum and if we do not fill it some one else will do so for us. That would probably be highly unsatisfactory. Let us, therefore, bestir ourselves and thoughtfully select a title that will be significant and entitled to legal protection. It is obvious that ill-considered and impulsive action would be unwise, but in the interim before our next national convention there is sufficient time for proper consideration of the question.

Let us try to choose a name which will be expressive of the professional attitude of the members of the association, the attitude which has been instrumental in advancing the aims of our organization and which is exemplified by the following characteristics of our leaders: positivism in contradistinction to uncertainty and passivity, which makes all the difference between the viewpoint of the professional and that of the mere technician; an open mind coupled with willingness and eagerness to learn; the feeling that membership implies the obligation to contribute independent thought and sustained interest. Through this attitude of mind alone can we become a potent force in directing the course of Physiotherapy. Our name should express these aims and this attitude.

R. D.

Convention time is drawing near with days and opportunities for renewing professional zest and warm vital life impulse. Restless winds of spring are whispering of the romance that beckons from mountain regions. The artist's brush or the writer's pen have never been able to describe the enchantment of the wilderness. It is an elusive charm that must be lived before it can be truly realized.

"Nature Coasting" in Rainier National Park

The embodiment of all nature's attractions may be found in Rainier National Park, Washington. The great mountain was formerly a volcano but now it lies dormant, its peak snow covered, and rivers of ice coursing down its scarred face.

One of the greatest attractions of the park is its easy accessibility from the four gateway cities, Seattle, Tacoma, Portland and Longview. National Park type auto stages leave daily direct for the park and every curve in the excellent highway reveals

Mount Rainier

new scenic wonders.

Paradise Valley, the end of the highway, is situated on a shoulder of the great mountain. Paradise Inn is a modern hostelry and every desirable convenience is available. Guide headquarters are but a few rods from the inn and start for all guide conducted trips is made from here.

The activities are so varied and intensely interesting that many days may be spent in the park and different areas visited each day. Wild flowers cover the meadows; their Persian carpeted loveliness mingles with primeval forests and vast snow fields. There is no crag so lofty that some bright bloom cannot find its way through a crevice to brighten the bleak surface.

In every valley are streams whose waterfalls form veils of mist that mingle with the alpine flowers in gorgeous rainbow hues. Jewel like lakes nestle in wooded valleys and provide ample sport for the angler as well as the swimmer.

One of the most unique sports in the park is nature coasting. The guide department furnishes "tin breeches," regular hiking breeches with canvas enforced seat, which has been treated with paraffin. The coasters climb to the top of the snow fields and then merely seat themselves on the snow and slide for great distances.

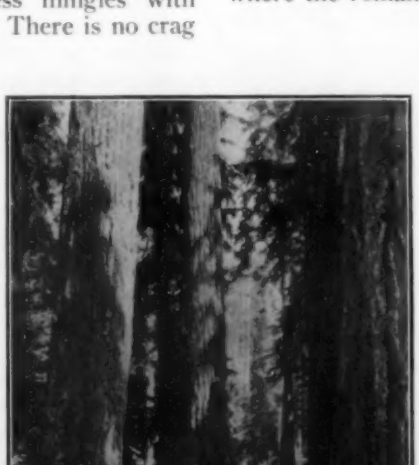
The glaciers furnish great field for adventure. There are huge crevasses, natural ice bridges and beautiful ice caves. The sun sifts through the translucent ceilings of ice and forms a beautiful symphony of greens and blues. The cool winds from the black depths of the caverns and the roaring streams that are born in these glaciers instill in the beholder a reverential fear of these great mysterious, slow moving rivers of ice.

Saddle horse trips are taken through deep forests where some of the trees are from 300 to 600 years old, being the oldest living things on earth next to the Sequoias of California.

And whatever the time of day or night, the mountain looms above; always majestic and inspiring, always attractive and lovely. Whether touched by the glow of dawn or glistening in bright midday sun; whether colored with rosy sunset tints, or glimmering ghost-like in the full of the moon; whether silhouetted clearly against cloudless skies or shrouded with mists; it is ever the symbol of an awe-inspiring power that entrances all who view it.

Rainier National Park is the inspiration center of the Pacific Northwest. All that is typical of this great region is gathered in the eighteen square miles of National Park where the romance of the Old West still lives.

H. M. B.



Nature's Noblemen

Abstracts

By John S. Coulter, M. D.

The Nature of Arthritis, with Consideration of the Rationale Underlying Some Forms of Physiotherapy Useful In This Disease. By Ralph Pemberton, M.D., Philadelphia, in Radiology, 12:3:235-7: March, 1929.

A fifth of all cases, especially atrophic in type, show a slight decrease in basal metabolism. There is a delayed removal from the blood of ingested glucose, which closely parallels arthritis and focal infection. Coincidentally with the delay in the removal of glucose, there tends to be, in the same blood, a delay in the utilization of oxygen also, at least in the smaller vessels, due to a change in the circulation. . . .

Corroboratory evidence of this conclusion has recently been forthcoming in the work of Dr. Goldhaft and myself on ligation of the patellar vessels of dogs. In agreement with Wollenberg, who first carried out this experiment, we have observed that hypertrophic arthritic manifestations arise when the blood supply is thus interfered with.

Exercise has been shown by Barr to induce a systemic acidosis which may last as much as an hour after even relatively mild effort. Cajori, Crouter, and the writer, on the other hand, have shown that heat systemically applied leads to an alkalosis induced by the loss from the body of acid substances, chiefly carbonic acid, and chiefly from over-ventilation of the lungs. With massage no such influence upon the acid base equilibrium could be observed as either heat or exercise induces. However, it seemed likely that there might be some common denominator between them to explain their influence. This is, indeed, to be found in the increased circulatory rate shown by a sharp rise in the oxygen percentage saturation of the peripheral blood, following both exercise and external heat.

It thus appears that, from the standpoint of precise laboratory observations, the only explanation which can now be afforded of the undoubted influence of massage, exercise and heat on the rheumatoid syndrome, is their influence upon the peripheral circulation.

The Treatment of Arthritis, Rheumatism, and Neuritis with Chemotherapy and Physiotherapy. By Walter M. Bartlett, M. D., and Miss E. Sunesen in N. E. J. of M., 200:8:376: Feb. 21, 1929.

From all recent reports on the treatment of arthritis it would not be too early to predict that it is a disease which will eventually be conquered by chemotherapy. It is probably advisable to modify any such prediction, however, by adding "with the aid of Physiotherapy."

Physiotherapy, particularly massage and medical gymnastics, plays a large part in the treatment of arthritis. The use of diathermy and electrotherapy is helpful in specially indicated cases, but in the advanced case of arthritis nothing can take the place of deep muscle massage and active and passive exercises.

Exercises are contraindicated in the presence of septic fever or during the most acute stages of toxic arthritis, but as soon as conditions permit, passive and active movements of the joints and general muscle massage should be given. Deep and vigorous muscle massage is given to all muscle groups to prevent muscle atrophy and spasm due to prolonged inactivity. Massage over the joints themselves is not advisable.

Effleurage or stroking is always used at the beginning and at the end of a treatment to improve the circulation and promote absorption. Exercises are at first strenuous and trying for a patient after a long illness, but as soon as the patient gains confidence in the operator, the improvement from day to day is surprising. Passive movements are followed by active movements and these in turn are increased in severity according to the patient's endurance and general condition. The patient should be encouraged to walk and use the joints as much as possible even in spite of pain.

The Place of Physiotherapy in the Treatment of Chronic Arthritis. Read before the joint meeting of the tenth councilor district and the scientific meeting of the Allegheny County Medical Society, Oct. 16, 1928, by H. C. Westervelt, M. D. Pittsburgh Medical Bulletin, Vol. 17, No. 36, Nov. 10, 1928, page 746-7:

"It is interesting to note that throughout the whole period summed up in this very casual review—with four or five generations of teachers, of many and ever changing views and opinions—the use of physical measures is consistently maintained; also that the consensus of opinion is unanimous as to their value and efficiency. The evidence plainly shows that every point of adverse criticism concerns the manner of application—i. e., the bad judgment of the operator—with not a single objection as to the practicality and efficiency of the measures themselves.

"Also, the fundamentals prerequisite to success are obvious, viz:

"a. Good Physiotherapy must be cooperative—adjuvant to other accepted agencies;

"b. Measures must be applied only by trained operators;

"c. The same care must be exercised in choice of measures;

"d. Measures must be applied only by trained operators;

"e. The whole proceeding must be directed by the physician himself."

Chronic cases with marked systemic disturbance and debility, cases with cardiac complications, or other disability requiring expert hydrotherapy, galvanic or other unusual electric treatment, or orthopedic care, are best left to hospital or sanitarium under the management of skilled and experienced operators. But there is a large percentage of patients in the chronic class exhibiting only such conditions as passive congestion, simple spasticity of the joints or of the surrounding tissues (or both), muscular atrophy or weakness, or what not; the inevitable results of the long disuse as well as of inflammatory change, which, for the most part, readily yield to very simple physical measures such as heat—preferably, in the opinion of the writer, obtained from an infra-red element of good size, as superior to "baking"—and exercise, such as afforded by a smooth sinusoidal current, and the patient himself—easily within the reach of any practitioner who is willing to invest in a modest equipment, and who is conscientious enough to inform himself thoroughly in the details of its safe and sane use.

The Physical Treatment of Arthritis. By Harold M. Herring, New York, in M. J. & Rec., Vol. 128, No. 12, Dec. 19, 1928, page 641:

In his conclusions the author says:

"The two main types of chronic arthritis are those whose changes are either of a hypertrophic character, or of an atrophic or degenerative nature. In the physical treatment of these the indications are:

"1. For relief of pain and for improving the nutrition of the joint, the use of light and heat, the whirlpool bath, diathermy, galvanism, and massage.

"2. For the stiffness, heat either from a luminous or infra-red source followed by massage and passive motion.

"3. For the associated conditions, viz., the muscle spasm, the use of the Morton wave from the static machine or heat followed by massage, and for the neuritic pains, longitudinal diathermy, the Oudin current or galvanism.

"4. For the constitutional improvement of the patient, the use of general ultraviolet radiation, cabinet bath, Scotch douche or contrast spray and auto-condensation."

Symposium on Cardiac Disease—The Treatment of Heart Disease. By S. Marx White, M.D., Professor of Medicine, University of Minnesota, in The Journal-Lancet, 49:3:59: Feb. 1, 1929.

The question of gradual resumption of effort, the heart muscle having been sufficiently rested to allow it. Preparatory to, and in this period, very light general massage, carefully controlled, together with Swedish movements, may be used. A little later, voluntary movements carefully regulated and gradually increased may be begun. Resistance exercises require a skilful operator and the expense of such is commonly prohibitive. The change to a sitting position must usually be gradual and with increasing length of time, often repeated several times a day. The chair is gradually resumed.

When the time for standing and walking arrives the number of steps may be counted and gradually increased; two, three or four steps a day at first, and more rapidly later. After a while when step counting mounts to 100 or more, certain routes on the floor will gradually have been adopted and the counting may be stopped. . . . It may be explained that each change from the horizontal—sitting in bed, then in a chair, and finally standing—means additional work for the heart to pump the blood columns against gravity, until the work in standing alone may be as much as four times that when lying. Walking slowly adds further work and each increase in pace adds its quota. Raising the weight of the body to different levels in the house increases by calculable amounts the heart work necessary. Stair climbing, if it can or should be allowed, must be by gradual increases of one or two steps at stated periods. It may take a period of two weeks, during which the other walks may be somewhat reduced, before a ten-foot climb with a half-way rest is allowed. The need for avoiding dyspnea or a fifteen beat increase in pulse rate or other signs of overexertion, such as heart pain, must be emphasized.

Effect of Bodily Exercise on Menstruation. By H. Runge in Deutsche Med Wchnschr., 54:2051: Dec. 7, 1928; Abst. in Jour. A. M. A., 92:8:689: Feb. 23, 1929:

In order to determine to what extent bodily exercise influences the menses, Runge studied 100 students in gymnastic training schools. The training in these institutions is intensive, requiring about 15 hours weekly. He found that in most cases gymnastics and sports exert a favorable influence not only on the general condition but also on the genital functions. In 69 cases changes were not observed, regardless of whether or not the students were training. In eight cases, the menses decreased in intensity. Runge explains this as being due to the better circulation resulting from the exercise. In four instances the periods became more regular and in eleven cases the painfulness was reduced. Only in from 15 to 20 per cent of the cases did he observe bad effects. On the basis of these observations he concludes that it is not necessary to prohibit bodily exercise during the menstrual period. If the student is willing to continue the training, restrictions need not be made. Complications seldom arise, especially in the case of young girls, and if they occur, they are almost never of a serious nature. However, in the event of irregularity in the menses, or in married women with a history of previous pregnancies or abortions, permission for gymnastic exercise during menstruation should not be given without a gynecologic examination, and it is best for each person to receive individual attention.

Fractures of the Femur. By W. L. Estes, M. D., Bethlehem, Pa., in Radiology, 12:3:247-8: March, 1929.

The military rating recognizes a "stationary period" of disability, which means the period beyond which no further improvement in function may be expected. In cases of fracture of the femur six years is the limit.

I think we have pretty well established the stationary period for fractures of the femur in civil life to be three years.

RECONSTRUCTION METHODS AFTER FRACTURE OF THE FEMUR

A surgeon should not consider his treatment completed, nor should he relinquish direction of a case of fracture, until the patient is restored to the fullest possible function. After every fracture it will be necessary to employ some Physiotherapy. In fractures of the femur, except perhaps in cases of children, these physiotherapeutic measures should begin as soon as the condition of the patient and the local reconstruction of the bone will permit. As was stated before, passive motion of the knee and ankle joints may as a rule be made after three weeks of confinement or traction. Massage, too, is very useful in preventing passive congestion and stiffening of muscles and joints; this may be begun at the same time passive movements are instituted. One great advantage of the suspension traction method is the facility it offers for flexion of the knee joint and early massage. By the older methods of traction and by confinement in casts or splints stiffening of the knee joint will inevitably occur and there may be a little atrophy of the muscles. These conditions must always receive serious and careful treatment for complete restoration of the patient's future usefulness. We have found, besides assisted movements and massage, diathermy to be very useful. Diathermy also seems to be of great service in cases of delayed union, combined with heliotherapy, fresh air, calcium salts internally, and massage. Physiotherapy should be given by a trained individual, be gradual and graduated, and always under the direction of the surgeon.

Check the Sun Bath. An Editorial in New England J. Med. 200:6:299: Feb. 7, 1929.

Professor Donald C. Stockbarger, assistant professor

of Physics at the Massachusetts Institute of Technology, has published under the above title a paper in the November issue of The Technology Review, warning against the indiscriminate, inaccurate and careless use of apparatus designed to produce ultraviolet radiation for therapeutic purposes. The article is timely. Artificial insolation has become a fad to such a degree that not only are many physicians employing various types of lamps for a multiplicity of uses, but the public is purchasing mercury vapor and carbon arc lamps for the purpose of dosing itself with the rays which they emit. . . .

A warning against the over-enthusiastic acceptance of ultraviolet radiation is timely and it must be repeated every time the patient researches of our fellows in the realm of science produce new and startling results. But it must be remembered that the human body and the physical laboratory are not comparable; that an exact science and an art which tries to employ science proceed along different lines, and that it hurts our pride as students of disease and of the humanities to be considered by a pure scientist as only pill peddlers and drug dispensers.

Shall Ultraviolet Rays Be Generally Used to Complement Winter Sunshine? An editorial in N. E. J. of M., 200:5:246-7: Jan. 31, 1929.

Recently a physician called this office and asked whether a certain institution engaged in using various forms of Physiotherapy is reputable and explained that a person was considering sending a group of students to be subjected to violet rays for the purpose of supplying the winter deficiency of sunlight. There was no question of specific evidence of the need of ultraviolet rays in the ensuing conversation, but the question was asked, "Why not use violet rays if prolonged exposure to the summer sun at bathing resorts is beneficial?"

Now comes the report of the warning in the report given out by the New York Academy of Medicine published in the New York Times of Jan. 9, 1929, based on the statement that "experimental confirmation of the well-known fact that cancer of the skin is more frequent among those exposed to excessive sunlight." A warning is issued as a part of the statement of three important steps made in the study of cancer; the first and second relating to the behavior of cells under certain conditions, and the third, which is endorsed by some physicians, to the effect that in certain cases "ultraviolet rays increase rather than retard the effectiveness of the agent producing cancer."

We are of the opinion that apparently healthy children should not be subjected to artificial ultraviolet rays and that this form of therapy should be under the control of competent physicians. We are in an age when all new therapeutic resources are overemphasized in the newspapers. We know that the valuable properties of electricity have been perverted to unwise uses. Enthusiasts as well as quacks have been guilty of playing to the imagination of the laity in many fields in the improper use of many therapeutic agents. Ultraviolet rays have become popular with some doctors and are especially alluring to the laity. Here as in many other departments of medicine a little knowledge may be dangerous. We appeal to the profession to urge the laity to refrain from using ultraviolet rays unless advised and controlled by physicians. Good ventilation and active exercise out of doors will, even in the winter, make the use of artificial ultraviolet rays unnecessary in the great majority of young people who are without evidence of certain definite diseases.

Ultraviolet Rays and Skin Cancer. By G. M. Findlay in Lancet, 2: 1070: Nov. 24, 1928; Abst. in Jour. A. M. A., 92:1: Jan. 5, 1929, page 91.

By exposure of mice to ultraviolet rays for a period of not less than eight months Findlay succeeded in producing papillomas and malignant epitheliomas of the skin. When mice are tarred and exposed to ultraviolet rays at the same time, the period necessary for the induction of cancer is shorter than when either tar or the ultraviolet ray alone is employed. A series of mice tarred for one month failed to develop cancer, but when tarred and exposed to ultraviolet rays for the same period, three mice developed malignant growths.

Fatal Use of An Ultraviolet Ray Apparatus. By London Correspondent to Jour. A. M. A., 92:7:571: Feb. 16, 1929.

A youth, aged 21, was found lying dead in his bath, which was half filled with water. An ultraviolet ray apparatus was at the side of the bath. Examination of the body by a physician showed that death was due to shock. The apparatus was submitted to an expert on electricity, who reported that the ultraviolet ray apparatus was so constructed that a shock could be received in five ways from it: from the metal case, because of the low insulation resistance of 20,000 ohms, whereas the resistance ought to have been one of several million ohms; from the exposed ends of a conducting wire removed from its position on the terminal; from the pressure on the wire guards putting the case of the instrument in direct contact with the heating element; from leakage of water into the appliance, thus completing a circuit through the water in the bath and to the earth through the water pipes; from a damaged lamp in the instrument, and, finally, from the absence of any provision for earthing the metal case. The boy persuaded the mother to let him buy the ultraviolet ray apparatus to remove comedones from the back of his neck. A book of instructions was given with the apparatus in which the user was recommended to apply the instrument in the bedroom but not in a bathroom because steam might interfere with the passage of the rays from the lamp. The coroner said the instructions seemed to be a "puff" suggesting that the apparatus would cure every disease that flesh was heir to. There was no adequate warning about the dangers attaching to the use of apparatus through which a house current of 230 volts might be passed. He thought it reprehensible that this appliance should be supplied by a firm posing as beauty experts.

Quartz Lamp Therapy in Human Rickets and Rachitic Spasmophilia. Efficiency of single weekly exposures. By Henry J. Gerstenberger and J. I. Hartman, Cleveland, in Jour. A. M. A., 92:5:368: Feb. 2, 1929.

These authors say in their conclusions:

Observations in thirteen rachitic and spasmophilic infants show that weekly exposures to the ultraviolet rays produced by the quartz lamp in doses of 1 erythema unit as determined by the method of Rost and Keller for colored infants, and less for white infants, front and back, bring about healing in practically the same time required by the heavier schedules at present generally used.

Because of the simplicity and economy of this ar-

rangement and because of the slight change that is produced by such exposures to the skin, the adoption of this schedule as a routine procedure in the cure and prevention of rickets and rachitic spasmophilia by the employment of the ultraviolet rays is recommended.

No increase in spasmophilic symptoms and no lengthening of the time period at the end of which cathodal opening contraction level was greater than five were observed in rachitic infants manifesting spasmophilic symptoms as a result of the use of the quartz lamp schedule followed by us.

Ultraviolet Rays and Clothing. In Science Supplement Nov. 2, 1928; Abst. in Canadian M. A. J., Vol. 19, No. 6, December, 1928, page 730:

"The health giving ultraviolet rays of sunlight, which everybody wants nowadays, pass through cotton, linen and rayon fabrics about equally well when these are of equal weight and closeness of weave. Fresh, white natural silk is almost as transparent toward the rays as bleached cotton, while wool is only about half as transprent. These are some of the results obtained in the study of the transmission of ultraviolet radiation through various fabrics, conducted at the U. S. Bureau of Standards by Dr. W. W. Coblentz, Dr. R. Stair and Dr. C. W. Schoffstall, and reported in the bureau's new Journal of Research. In all cases when the fabric is dyed, or slightly yellowed with age, the ultraviolet transmission through the thread is greatly decreased. Hence, as is to be expected in comparing various kinds of dyed fabrics, the one having the largest openings between the threads transmits the most ultraviolet."

Antirachitic Efficiency of Skyline. W. D. Fleming in Military Surgeon 63:658: Nov. 1928; Abst. in Jour A. M. A. 91:24:1923: Dec. 15, 1928.

Experiments made by Fleming with rats show that the light received from the north sky (skyshine) without direct sunlight, in Washington, D. C., during the months of April, May, June and July, 1928, afforded sufficient ultraviolet to promote normal ossification in rats confined under a glass permeable to ultraviolet to a degree of about 29 per cent, these rats being on a diet which produced marked rickets in rats receiving no ultraviolet rays under window glass. The gain in weight of the rats receiving this amount of ultraviolet was also greater than in the rats under window glass. It appears, therefore, that a solarium designed for ultraviolet therapy and glazed with a glass premeable to ultraviolet rays to the degree of at least 29 per cent need not be placed on the south side of a building where it will receive direct sunlight, but, at least as far as antirachitic therapy is involved, will be effective if it receives the light from only the northern hemisphere of the sky.

Actinic Therapy in the Treatment of Mental Patients. By J. Allen Jackson and L. R. Chamberlain in M. J. & Rec., Vol. 128, No. 12, Dec. 19, 1928, page 646:

"A summary of the cases treated shows, that of the seventy-three patients treated, forty showed a gain in weight, thirty-four mental improvement, while twenty-six showed a loss of weight and thirty-nine no mental improvement. Seven showed no change in weight.

"An analysis of the psychoses shows that of the seventy-three cases, forty-five were of the maniac depressive groups. Of these forty-five, twenty-six gained physically, five showed no change in weight, while fourteen showed loss of weight. Twenty-two gained mentally (usually associated with weight gain) while twenty-three showed no gain.

"The remaining psychoses are in insufficient numbers to make any deduction of the treatment of a given psychosis. It is interesting to note, however, that the patients showing a tendency to gain in weight were first, the paretics, then the senile patients and lastly the psychoneuroses and dementia praecox patients. The cases are too few, however, to support such a suggestion.

"In making deductions of any new treatment suggested for the manic depressive groups, we should always bear in mind that improvement in this group occurs after rest, full feeding and the various therapies, such an improvement being first noticed as gain in weight and mental improvement. We also must remember the tendency on the part of the paretic to gain in weight. Nevertheless, we believe we are safe in stating in our conclusions that actinotherapy does promote a gain in weight and a sense of well being in mental patients.

"Our conclusions are: (1) that actinotherapy finds its usefulness in the treatment of mental patients; (2) that the expense of such a therapy is comparatively small; (3) that it is of value in the local treatment of furuncles, bed sores, pustular skin diseases, vague myalgia pains, while the benefit of general irradiation reflects itself in increased metabolism and a sense of well being of the mental patients; (4) that in the long drawn out winter months we have found it especially a good substitute for heliotherapy."

A Brief Outline of Dermatology, Especially in Its Relation to the Practitioner of General Medicine. By George M. MacKee M. D., Professor of Dermatology and Syphilology, New York Post Graduate Medical School and Hospital. In Southern M. J., 22:1:26-27: January, 1929.

Before closing I should like to touch briefly on the subject of physical therapy as used in dermatology. Physical therapy is an important part of dermatology, but it is only one part and by no means the most important part. So far as concerns dermatology, physical therapy has been somewhat over-emphasized. The X-rays constitute the most useful single therapeutic agent in the armamentarium of the dermatologist. Their greatest value is for the relief of symptoms. With the exception of a few diseases it is a mistake to depend upon their use alone. They are exceedingly dangerous in unskilled hands and they should not be employed for the treatment of skin diseases except by or under the supervision of a physician who has expert knowledge of both the disease and the therapeutic agent, and the only physician who possesses this combined knowledge is the properly trained dermatologist. . . .

Ultraviolet radiation is considered by most physicians to be devoid of danger, but dermatologists daily encounter injuries caused by the injudicious use of this agent. Repeated blistering doses may cause atrophy and permanently alter the distribution of the pigment. Even mild exposures may precipitate an attack of lupus erythmatosus. Erythema doses may cause erythema solare and herpes; or they may cause diseases such as eczema and psoriasis to exacerbate, become generalized or even to change to dermatitis exfoliativa. The long continued use of ultraviolet radiation by persons who are idiosyncratic may cause, in later life, atrophy, keratoses and even cancer, a condition that simulates the so-called farmer's skin or sailor's skin, chronic radiodermatitis and xeroderma pigmentosum. Furthermore,

we frequently encounter diseases that have been treated with ultraviolet radiation when such treatment is distinctly contra-indicated. This modality should not be used by physicians who obtain their instruction from manufacturers or who take a few lessons from a traveling technician. It is advisable to possess adequate knowledge of the agent and of the disease to be treated.

High frequency currents are popular among dermatologists and they are beginning to be popular among general practitioners. The methods usually employed are three in number, namely: electro-desiccation, electrocoagulation and endothermy (surgical diathermy). These methods are valuable when properly selected and skillfully used, but here, again, the physician should not employ them in the absence of adequate knowledge of both the agent and the disease.

The Treatment of Acne. By H. G. Wertheimer, M. D., Pittsburgh, Pa., in Pennsylvania M. J., 32:5:321: February, 1929.

The actinic light treatment we have found beneficial, particularly in combination with the X-ray or with local applications. In order to obtain a satisfactory result with the alpine lamp, a mild erythematous dermatitis should be produced. This causes a retrogression of the superficial lesions, and has a germicidal effect in addition.

The Treatment of Psoriasis. By Sigmund S. Greenbaum, M. D., Philadelphia, in Pennsylvania M. J., 32:5:323: February, 1929.

Physical, which includes sunlight, ultraviolet radiation, and the X-ray. All of these agents may induce temporary disappearance of a psoriatic eruption. Psoriatic lesions are rarely resistant to roentgenization, but are not uncommonly so to ultraviolet radiation. This latter agent will rapidly clear an acute generalized eruption if peeling doses are given, but is apt to give disappointing results in chronic lesions. The X-ray is a far more valuable but a more limited and dangerous adjunct to our therapeutic armamentarium.

Diathermy in Pneumonia. Texas State Jour. Med., 24:9:652: January, 1929.

The use of diathermy in pneumonia was studied by Carl A. L. Binger and Ronald V. Christie, New York (Jour. A. M. A., Aug. 11, 1928). Their experiments point to the efficiency of the pulmonary circulation in cooling the normal lung and in preventing any considerable degree of local heating. It appears that the lungs represent an excellent water cooled system rather than an air cooled one, and that an intact pulmonary circulation prevents any considerable degree of local heating by the diathermy current. The next step in this study was to inquire whether the interference with the pulmonary circulation in pneumonia was sufficient to permit local heating. In none of the three patients studied was there an appreciable rise in lung temperature, as compared with the rectal temperature. The statement is frequently made that cyanosis disappears, or at least becomes less pronounced, after treatment by diathermy. The disappearance of cyanosis is so commonly reported by those who use diathermy in pneumonia that one may for the moment assume it to be true. An examination of the oxygen saturation of the arterial blood should give some hint as to the cause of the improvement in color. Binger and Christie have in two instances done arterial punctures before and after diathermy, and have analyzed the arterial blood for its oxygen content and capacity. In one case the percentage saturation rose from 70.3 to 73.4; in the other from 81.2 to 82.3. Neither of these changes can be regarded as significant, as they are both probably within the physiologic variations occurring during pneumonia.

Should Physical Therapy Be Hospital Controlled? By Dr. Harry Leslie Langnecker, Leland Stanford University Hospital, San Francisco, Calif., in Bull. Amer. Hosp. Assoc., 3:1:94-5: January, 1929:

"The hospital which desires to offer adequate medical service to its community faces the problem of maintaining and furnishing efficient physical therapy treatment. Just as the X-ray department or the clinical laboratory are necessary for diagnostic procedures, so the indicated use of such physical agents as water, light, heat, electricity, and exercise are essential adjuncts in the treatment of a host of medical and surgical conditions. The hospital is the proper place for the administration of physical therapy. . . .

"The purpose of a physical therapy department in a hospital should be two-fold. Primarily it is to furnish indicated treatment to referred patients; to complete the work of the surgeon, to assist the physician in bringing his patient back to normal health, to repair or restore function, to improve the patient's morale, to make a producer, to minimize the financial burden.

"Secondarily, and it should seem equally important, to furnish to the physician the real scientific knowledge about physical therapeutics; advising and assisting him as regards physical modalities in medical practice; encouraging the local medical profession to delve into the rational application of the various procedures; to afford opportunity for medical research and practical study of the real value of physical therapeutics and applications; to train the hospital interne in prescribing sane physical therapy; to familiarize the nurse in training with the use of water heat, postural methods, and massage, toward the better handling of patients, to train technicians to understand and manipulate the rather complex physical therapy apparatus and adequately administer the various treatments under the supervision of a regular physician."

The Study of Physiotherapy as a Vocation

By Lucile R. Grunewald

CHAPTER VI

PRESENTATION OF DATA BASED ON OBJECTIVE IV: TO SUGGEST LEGISLATION DETERMINING THE REQUIREMENTS FOR LICENSING THE PRACTICE OF PHYSIOTHERAPY

Since Physiotherapy is becoming a distant vocation and since there is a definite need for standardization in the training of physiotherapists there should be state laws regulating the practice of Physiotherapy and state certification and registration for the protection of well trained physiotherapists and for the public whom they serve. This should raise the status of the vocation of Physiotherapy to a more professional plane.

The development of the State Medical Practice Act of California[1] and a brief résumé of legislation in California affecting the practice of osteopathy[2] are both examples of the growth and development of similar professions.

"RESUME OF LEGISLATION IN CALIFORNIA AFFECTING THE PRACTICE OF OSTEOPATHY

"Osteopathy was first given legal recognization in California through the passage of a law which became Chapter 99, Statutes of 1901. The act contained the following provisions:

"1. Appointment by the governor of a board known as the board of osteopathic examiners, consisting of five qualified, practicing osteopaths from the membership of the California Osteopathic Association.

"2. Educational requirements: Each applicant was required to be a graduate of a legally chartered college of osteopathy having a course of instruction of at least twenty months.

"3. Issuance of certificates to practice osteopathy upon examination or at the discretion of the board upon presentation of diploma from a legally chartered college of osteopathy. Certificates issued thereunder did not authorize holder to use or prescribe drugs or perform major surgery.

"The board of osteopathic examiners functioned in the regulation of the practice of osteopathy and the certification of those so licensed until May 1, 1907, when the Medical Practice Act of 1907, designated Chapter 212, Statute of 1907, became effective. This measure repealed the prior medical and osteopathic acts and provided for the appointment of a composite board to regulate applicants from all schools and the practice of those licensed. This act contained the following provisions:

"1. Board made up as follows: 5 members of Medical Society of state of California; 2 members of California Homeopathic Society; 2 members of Eclectic Medical Society; 2 members of Osteopathic Society of state of California.

"2. Three forms of certificates issued thereunder: 1. A certificate authorizing holder thereof to practice medicine and surgery; 2. A certificate authorizing holder thereof to practice osteopathy; 3. A certificate authorizing holder thereof to practice any other system or mode of treatment of the sick or afflicted not referred to in this section.

"3. Requirements: (a) Applicants for certificate to practice medicine and surgery were required to produce a diploma issued by a legally chartered medical school, the requirements of which were not at the time of granting said diploma in any particular less than those prescribed by the Association of American Medical Colleges for that year; (b) The applicant for a certificate to practice osteopathy was required to file a diploma from a legally chartered college of osteopathy, requiring actual attendance for a course of instruction of at least twenty months. After 1908, the osteopathic applicant was required to file a diploma from a legally chartered college of osteopathy requiring actual attendance of three years of nine months each and including the subjects examined upon under this act.

"Applicants for a certificate to practice any other system or mode of treatment were required to file a diploma from a legally chartered college of the system or mode of treatment which the applicant claims or intends to follow.

"4. Examination: Applicants for all forms of certificate were given the same examination which covered and included all the basic science subjects underlying medical practice. Direct examination in the subjects of materia medica, practice and surgery was not given.

"This act was repealed by the passage of the present Medical Practice Act, Chapter 354, Statutes of 1913, which became effective Aug. 10, 1913. As originally enacted, this act provided for the issuance of: 1. Physician and surgeon certificate; 2. Drugless practitioner certificate; 3. Reciprocity certificate for physicians and surgeons.[3]"

Judging from the history of legislation in these related professions, the next logical step in the development of Physiotherapy, as a distant vocation, is the enactment of legislation regulating the practice of Physiotherapy in the various states. There follows a tentative draft of a bill patterned after the California Osteopathic Act discussed in this chapter, and embodying the conclusions reached in previous chapters of this thesis.

PHYSIOTHERAPY ACT

An act to establish a board of Physiotherapy examiners, to provide for their appointment, and to prescribe their powers and duties; to regulate the examination of applicants who are graduates of schools of Physiotherapy for a certificate to treat diseases, injuries, deformities, or other physical or mental conditions referred by physicians or surgeons; to regulate the practice of those so licensed, who are graduates of schools of Physiotherapy; to impose upon said board of Physiotherapy examiners all duties and functions, relating to graduates of

[1] The State Medical Practice Act of California, amended to May 14, 1925. California State Printing Office.

[2] The Osteopathic Act of California. California State Printing Office.

[3] *Directory of Graduates of Osteopathic Schools Holding Physicians' and Surgeons' Licenses, Osteopathic Licenses, Drugless Practitioner Licenses.* Published by the board of osteopathic examiners, Mar. 3, 1927, pp. 5-6. California State Printing Office.

schools of Physiotherapy, holding or applying for a certificate or license.

The people of the state of California do enact as follows:

Section 1. A self sustaining board of Physiotherapy examiners to consist of five members and to be known as "The Board of Physiotherapy Examiners of the state of California" is hereby created and established. The governor shall appoint the members of the board, each of whom shall be appointed from among persons who are graduates of schools of Physiotherapy and who are approved by the California Medical Association and three of the members shall be licensed orthopedic physicians and surgeons of the state of California. The governor shall fill by appointment all vacancies on the board. The term of office of each member shall be three years; PROVIDED, that of the first board appointed, one shall be appointed for one year, two for two years and two for three years and that thereafter all appointments shall be for three years, except that appointments to fill vacancies shall be for the unexpired term only. The governor shall have power to remove from office any member of the board for neglect of duty, for incompetency, or for unprofessional conduct. Each member of the board shall, before entering upon the duties of his office, take the constitutional oath of office. All fees collected on behalf of the board of Physiotherapy examiners and all receipts of every kind and nature shall be reported at the beginning of each month for the month preceding, to the state controller and at the same time the entire amount must be paid into the state treasury and shall be credited to a fund to be known as the "Board of Physiotherapy Examiners' Contingent Fund," which fund is hereby created. Such contingent fund shall be for the use of the board of Physiotherapy examiners and out of it and not otherwise shall be paid all expenses of the board. Necessary traveling expenses and a per diem not to exceed ten dollars ($10.00) for each day of actual service in the discharge of official duties may be paid to each member of the board, provided the fees and other receipts of the board are sufficient to meet this expense.

The governor shall appoint the members of said board within thirty days after this act takes effect. The board shall be organized within sixty days after the appointment of its members by the governor by electing from its number a president, vice president and a secretary who shall also be the treasurer, who shall hold their respective positions during the pleasure of the board. The board shall hold one meeting annually beginning on the second Tuesday in January in the city of Sacramento with power of adjournment from time to time until its business is concluded. Special meetings of the board may be held at such time and place as the board may designate. Notice of each regular or special meeting shall be given twice a week for two weeks next preceding each meeting in one daily paper published in the city of San Francisco, one published in the city of Sacramento, and one published in the city of Los Angeles, which notice shall also specify the time and place of holding the examination of applicants. The secretary of the board, upon an authorization from the president of the board, or the chairman of the committee, may call meetings of any duly appointed committee of the board at a specified time and place and it shall not be necessary to advertise such committee meetings. The board shall receive through its secretary applications for certificates to be issued by said board and shall, on or before the first day of January in each year, transmit to the governor a full report of all its proceedings together with a report of its receipts and disbursements.

The office of the board shall be in the city of Sacramento. Sub-offices may be established in Los Angeles and San Francisco and such records as may be necessary may be transferred temporarily to such sub-office. Legal proceedings against the board may be instituted in any one of said three cities.

The board may from time to time adopt such rules as may be necessary to enable it to carry into effect the provisions of this act. It shall require the affirmative vote of three members of said board to carry any motion or resolution, to adopt any rules, pass any measure, or to authorize the issuance or the revocation of any certificate. Any member of the board may administer oaths in all matters pertaining to the duties of the board and the board shall have authority to take evidence in any matter cognizable by it. The board shall keep an official record of its proceedings, a part of which record shall consist of a register of all applicants for certificates under this act together with the action of the board upon each application.

The board shall have the power to employ legal counsel, to advise and assist it in connection with all matters cognizable by the board or in connection with any litigation or legal proceedings instituted by or against said board and may also employ inspectors, special agents and investigators, and such clerical assistants as it may deem necessary to carry into effect the provisions of said act. The board may fix the compensation to be paid for such services and may incur such other expense as it may deem necessary; PROVIDED, HOWEVER, that all of such expense shall be payable only from the said fund hereinbefore provided for and to be known as the "Board of Physiotherapy Examiners' Contingent Fund."

Every applicant for any form of certificate shall pay to the secretary-treasurer of the board the fees prescribed by law. Every licentitate, or certificate holder, subject to the jurisdiction of this board, shall on or before the first day of January of each year pay to the secretary-treasurer the annual tax and registration fee prescribed by law.

Section 2. All persons who are graduates of schools of Physiotherapy and who desire to apply for a certificate shall make application therefor, to said board of Physiotherapy examiners of the state of California. The board of Physiotherapy examiners in respect to graduates of schools of Physiotherapy applying for certificates is hereby authorized and directed to carry out the terms and provisions of the Physiotherapy act, approved ————————, 192—, and all acts amendatory thereof, and all laws hereafter enacted prescribing and regulating the approval of schools, the qualifications of applicants for examination for the certificate, the applications for the certificate, the admission of applicants to examinations for the certificate, the conduct of examination, the issuance of the certificate, the collection of fees from applicants, the collection of an annual tax and registration fee, the compilation and issuance of a directory, the revocation of the license or certificate, the prosecution of persons who attempt to practice without a certificate, and all other matters relating to the graduates of Physiotherapy schools, holding or applying for any form of certificate or license. Every applicant to said board of Physiotherapy examiners for a certificate shall pay to the secretary-treasurer of the board the fees prescribed for such application by said Physiotherapy Act, approved

————————, 192—, or any acts amendatory thereof or law hereafter enacted. Said board of Physiotherapy examiners shall, in respect to all the matters aforesaid, relating to graduates of schools, applying for or holding any form of certificate or license, take over, exercise and perform all the functions and duties imposed upon and heretofore exercised or performed by the board of medical examiners of the state of California under the provisions of the State Medical Practice Act, approved June 2, 1913, and acts amendatory thereof. The provisions of said State Medical Practice Act, approved June 2, 1913, and acts amendatory thereof, are hereby declared to be applicable to said board of Physiotherapy examiners in respect to all of the aforesaid matters and all other matters now or hereafter prescribed by law relating to the graduates of colleges of Physiotherapy holding or applying for any form of certificate or license. In no other respects than as herein provided shall the jurisdiction, duties or functions of said board of medical examiners of the state of California be in any wise limited or changed; nor shall the board of Physiotherapy examiners have any power or jurisdiction over the graduates of any other than Physiotherapy schools. From and after the time of the organization of the board of Physiotherapy examiners said board of medical examiners of the state of California shall have no further jurisdiction, duties or functions with respect to graduates of Physiotheraphy schools holding or applying for any form of certificate or license and the said jurisdiction, duties and functions, shall be assumed and performed by said board of Physiotherapy examiners.

Section 3. This act be known and cited as the "Physiotherapy Act."

The following is suggested as amendatory to the Physiotherapy Act:

Applicants who were engaged in the study of Physiotherapy prior to this enactment may secure licenses by passing an examination conducted by the board of Physiotherapy examiners. Admission may be secured upon certification by certificate and affidavit to the board of Physiotherapy examiners that such applicant has been graduated from an approved secondary school and from a Physiotherapy school or college in the United States with credentials satisfactory to the board and from a course of satisfactory study of not less than three years. Students matriculating after the passing of this Physiotherapy act must study Physiotherapy not less than four years in a school or college maintaining a standard satisfactory to the State Board of Education.

There is an urgent need for legislation in the practice of Physiotherapy in many states. It is hoped that the legislation in the state of California be similar to that in the state of New York, requiring a four year training beyond the high school. To fulfill this state requirement it is suggested that the University of California offer in its School of Education a four year course in Physiotherapy leading to the Degree of Bachelor of Science. This course should be affiliated with several hospital clinics allowing for adequate practical experience in all branches of Physiotherapy.

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Treatment of Pelvic Inflammation by Diathermy. C. A. ROBINSON, M.B., Amer. Jour. Phys. Ther., March, p. 539.

WEARY BODY NEEDS REST, NOT FOOD.

Americans have developed the habit of eating and drinking to relieve fatigue or merely to pass the time. When a person is tired the body needs a chance to recuperate and it is not advisable to take in quantities of food at such a time or to overstimulate the body with drinks and drugs, observes *Hygeia* editorially. Rest in times of fatigue will do more for the digestion than something thrown into the stomach.

The human being eats to provide energy for his daily work. The antidote to the desire to eat is the development of feelings of satisfaction. Those who go on eating merely because food is set before them overtax a system that recovers slowly from undue effort.

STATEMENT OF THE OWNERSHIP, MANAGEMENT CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

Of THE PHYSIOTHERAPY REVIEW, published bi-monthly at Mount Morris, Illinois, for April 1, 1929.

State of..... } ss.
County of ..... }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Dorothea M. Beck, who, having been duly sworn according to law, deposes and says that she is the editor of THE PHYSIOTHERAPY REVIEW and that the following is, to the best of her knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Kable Brothers Company, Mount Morris, Ill.; Editor, Dorothea M. Beck, Montclair, N. J.; Managing Editor, Gertrude Beard, Chicago, Ill.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) The American Physiotherapy Association. President: Hazel Furscott, San Francisco, Calif.; Secretary: Charlotte Ballard, San Francisco, Calif.; Treasurer: Florence Burrell, Oakland, Calif.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

DOROTHEA M. BECK, Editor.

Sworn to and subscribed before me this second day of April, 1929.

ERLAND M. NELSON, Notary Public.

(My commission expires April 8, 1932.)